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Supplier application reference nr	Supplier number	Unique registration reference nr	Legal name	Trading name	Identification type	Identification number	Edit	View	Remove		
MAAA0169241870	N/A		Tshingombe	Tshingombe	International Securities Identifi	520					

					Registration Number (ISIN)						
R0169242840	N/A		Tshingombe	Tshingombe	Foreign Company Registration Number	520					

SUPPLIER INFORMATION

	Tshingombe tshitadi			
	103 percy street			
	103 percy stree jhb			
	CODE		NUMBER	0787
	072598946			
	CODE		NUMBER	
	Tshingombefiston@GMAIL.COM			
VAT REGISTRATION NUMBER	N/A			
	TCS PIN:		**OR** CSD No:	
ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH	Y☐Yes ☐No [IF YES ENCLOSE PROOF]	*ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES OFFERED?*		Y [
	20	***TOTAL BID PRICE***		
	.....TSHINGO.....	***DATE***		

PART A
INVITATION TO BID

EBY INVITED TO BID FOR REQUIREMENTS OF THE (
TY) ***TOTAL NUMBER OF ITEMS***

69241870	CLOSING DATE:	2023/09/2

CAPACITY UNDER WHICH

UL BIDDER WILL BE REQUIRED BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED

DOCUMENTS MAY BE DEPOSITED IN THE
ED AT *(STREET ADDRESS*

treet rockview flet

TECHNICAL INFORMATI
DIRECTED TO:

EDUCATION	CONTACT PERSON	EI
072598946	TELEPHONE NUMBER	07
EDUCATION	FACSIMILE NUMBER	
072598946	E-MAIL ADDRESS	
TSHINGOMBEFISTON@GMAIL.COM		
072598946		

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.

2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.

2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?

y☐ YES ☐ NO

3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA?

y☐ YES ☐ NO

3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? Y☐ YES ☐ NO

3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?

Y☐ YES ☐ NO

3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?

Y☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

SIGNATURE OF BIDDER:

.....

TSHINGOMBE

TSHITADI.....

CAPACITY UNDER WHICH THIS BID IS SIGNED: ..... STUDENT... LEARNER.....

DATE:

2023/09/12.....

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Standard Bidding Document (SBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:

a. disregard the bid of any bidder if that bidder, or any of its directors have abused the institution's supply chain management system and or committed fraud or any other improper conduct in relation to such system.

b. cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.

4 This SBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.

[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

_____
R0169241870_____
_____

(Bid Number and Description)

in response to the invitation for the bid made by:

_____TSHINGOMBE
TSHITADI / ST PEACE COLLEGE
/_____
_____

(Name of Institution)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of:_____TSHINGOMBE TSHITADI_____
____that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word “competitor” shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

    (a) has been requested to submit a bid in response to this bid invitation;

    (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and

(c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

SBD 9

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
   (a) prices;
   (b) geographical area where product or service will be rendered (market allocation)
   (c) methods, factors or formulas used to calculate prices;
   (d) the intention or decision to submit or not to submit, a bid;
   (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
   (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

[3] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

SBD 9

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive

practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

.....TSHINGOMBE

.....

.....

Signature

Date

.....LEARNER / STUDENT ...../ 2023 /09/2.....

.....

Position

Name of Bidder

Js914w 2

SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;
b. committed fraud or any other improper conduct in relation to such system; or
c. failed to perform on any previous contract.

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No

4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? **(Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied).** The Database of Restricted Suppliers now resides on the National Treasury's website(**www.treasury.gov.za**) and can be accessed by clicking on its link at the bottom of the home page.	Yes Y☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes Y☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes Y☐	No ☐
4.4.1	If so, furnish particulars:		

SBD 8

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)… TSHINGOMBE TSHITADI……. ……

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

TSHINGOMBE…… …… ……
Signature **Date**

……LEARNER TSHINGOMBE / 2023 /09/20…… ……
Position **Name of Bidder**

Js365bW

SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;
b. committed fraud or any other improper conduct in relation to such system; or
c. failed to perform on any previous contract.

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

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4.1.1	If so, furnish particulars:		

4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes Y☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes Y☐	No ☐

4.4.1	If so, furnish particulars:

SBD 8

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)… TSHINGOMBE TSHITADI…….. ……
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

TSHINGOMBE…….. …… ……..
Signature **Date**

……LEARNER TSHINGOMBE / 2023 /09/20…….. ……..
Position **Name of Bidder**

Js365bW

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Case No: 474178762
Issue Date: 23/09/2023
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jhb
1030
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Dear tsh TSHITADI
REQUEST FOR RELEVANT MATERIAL
The South African Revenue Services (SARS) would like to thank you for registering for SARS eFiling.
In order for us to finalise your eFiling Registration, we request that you provide the following relevant material:
- Proof of identity
- Proof of residential address
- Bank statement not older than 3 months
- Photo of yourself holding your proof of identity
Please submit relevant material through any of the following channels:
- Via eFiling using the username and password that you provided during the registration process; or
- At your nearest SARS branch.
When submitting your relevant material at a

branch, please ensure that you enclose this original letter as it contains a
unique bar-coded reference which links it to your application. SARS only accepts relevant material in A4 format.
The relevant material must be submitted within 21 business days from date of this letter, failing which your
eFiling user registration will be declined.
Should you have any queries please call the SARS Contact Centre on 0800 00 7277.
Remember to have your taxpayer
reference number at hand when you call to enable us to assist you promptly.
Sincerely
ISSUED ON BEHALF OF THE COMMISIONER FOR THE SOUTH AFRICAN REVENUE SERVICE

REFERENCE
LIBRRY TABLE ...CITY POWER ESKOM
DTC NAZSA

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VACANCY BULLETIN: REF 001
DESIGNATION: ELECTRICIAN (SHIFT WORKER)
GROUP: SERVICE DELIVERY CENTRE
DEPARTMENT: VARIOUS SDCs
REPORTING TO: TEAM LEADER: DISTRIBUTION
TASK GRADE 9 (R350 966)
Appointment Minimum Requirements:
• Electrical Trade Test Certificate AND
• N2 Electrical Engineering AND
• Three (3) years' experience in the electrical distribution environment AND
• Valid Code C1 Driver's License
• Valid Professional Driver's Permit (Must be acquired within 3 months of employment)
Primary Purpose:
Perform daily maintenance, repair and installation of electrical systems and equipment. Perform network operating at all voltage levels to ensure a continuous availability of supply. To ensure a reliable and safe electrical system through the application of technical competencies in various tasks requiring a certified level of skills. Contribute towards maintaining a high level of customer satisfaction
Key Responsibilities:
Diagnose equipment malfunctions and repair and adjust using the necessary test equipment, instruments and other tools of the trade. Install, modify and maintain new and existing systems and equipment by working from drawings and sketches and through verbal instructions. Optimally

respond to all emergency call outs and
complaints and ensure best possible response time. Inspect large electrical systems and ensure all City power requirements are met. Maintain all motors, transformers and electrical controllers attached to large
power systems. Perform preventative maintenance on the electrical system i.e. switches, transformers etc. Carry out scheduled plant and equipment inspection on a regular basis to ensure a safe reliable network with
minimum interruptions. Repair and install LV and MV underground and overhead networks and the associated transformers and switchgear. Ensure the right tools and equipment is available and in good condition. Assess
requirements for each specific task. Confirm the suitability of equipment for possible refurbishment or re-use. Ensure customer satisfaction. Ensure compliance with all relevant legislation and SHEQ requirements.
CLOSING DATE: 21 SEPTEMBER 2022
ENQUIRIES: Ext 7343/7687/7099
TO APPLY EMAIL: recruitment.SDC@citypower.co.za
BULLETIN: 001/2022 REF NO: 001
NB: The City Power application form must be completed and submitted with the application to
the relevant email address provided for the specific position. Failure to complete and submit the
form will disqualify the applicant for consideration
Note:
• City Power is an Employment Equity Employer; therefore, preference for this position will be given to candidates whose appointment will enhance representation (especially Gender and Disability).
• If you do not hear from us within 2 months of the closing date, you may assume that your application was unsuccessful.
• Applicants must note that further checks will be conducted once they have been shortlisted and that their appointment will be subject to positive outcomes on these checks, which include qualification authentication, criminal records and previous employment.
• City Power reserves the right not to fill the position or to re-advertise it. Where applicable, candidates may be expected to undergo psychometric assessments.
• It is the applicant's responsibility to have their foreign qualifications evaluated by the South African Qualifications Authority (SAQA) and to provide the evaluation results.
• Please include copies of your qualifications with your applica
Power Johannesburg
40 Heronmere Road
Reuven
Johannesburg
PO Box 38766
Booysens
2016
www.citypower.co.za
Tel +27(0) 11 490 7000
Fax +27(0) 11 490 7590
CITY POWER
JOHANNESBURG
Bidders are hereby invited for the following RFQ,
further details are available from CITY POWER,
Tender Advice Centre, 40 Heronmere Rd, Rueven, Booysens
Telephone 011 490-7000, Fax 011 490-7765/011 870-3688
CITY POWER JOHANNESBURG (PTY) LTD.
ADVERTISEMENT
REQUEST FOR QUOTATION FOR THE ASSESSMENT 0F EXISTING ELECTRICIANS
TRAD TEST PANELS
REQUEST FOR QUOTATION: Learning Academy
SITE MEETING VENUE: Tender advice centre
SITE MEETING TIME: 10am
DATE OF SITE VISIT: 8 January 2015
RFQ CLOSING DATE: 12 January 2015
RFQ CLOSING TIME: 11h00
CONTACT PERSONS: Zanele Pokwane
RFQ DOCUMENTS WILL BE AVAILABLE ON SITE AND ON THE WEBSITE
AS FROM 6 JANUARY 2015
40 HERONMERE ROAD REUVEN, BOOYSENS
SUBMISSIONS: QUOTATION BOX, TENDER ADVICE CENTRE
Please note:-
That we also advertise on our

Website:Website
Address: www.citypower.co.za
Available Bid's and RFQ'S
SPECIFICATION AND REQUIREMENTS
EVALUATION CRITERIA
MINIMUM THRESHOLD OF 80% ON TECHNICAL FUNCTIONALITY MUST BE ACHIEVED FAILING WHICH, THE BID WILL NOT BE FURTHER EVALUATION
APPOINTMENT OF A VERIFICATION AGENCY
1st Stage Evaluation: A minimum threshold of 80% must be achieved to proceed to the 2nd Stage Evaluation
Evaluation will be done on a relationship to the weighting on a scale of 0 to 10
Mandatory requirements:
1. Provide proof of National Artisan Moderating Body (NAMB) and/or SETA accreditation
Technical Evaluation: Weight
1. Provide a detailed proposal outlining the latest trade test modular panels for electricians and evaluate existing 40
2.
Provide lead time
Max score points =10 points
Less than 2 days – 10 points
3-5 days = 7 points
More than 5 days = 3 points
30
3.
Provide contactable references of similar work projects done with following:
Company name
Contact person
Contact number
Scope of work
Max score points =10 points
2 and above contactable references = 10 points
2 contactable references = 7 points
1 contactable reference = 3 points
30
Total 100
2nd Stage Evaluation
PRICE 80
B-BBEE 20
Supply Chain Management Delivery Address
Finance Group 40 Heronmere Road
CP Reference Number: Rueven
Date: 06/01/2015 Johannesburg
Contact Person: Zanele Pokwane
Tel: +27 11 490 7083

Fax: +27 11 870 3339
Email: zpokwane@citypower.co.za
Company: ……
Attention: ……
Tel: ……
Fax: ……
You are hereby invited to submit a quotation for the items listed below. Please provide a written quotation to the above named contact person on or before the closing date indicated below. Only quotations which contain the information listed below will be accepted. Prices should be shown both exclusive and inclusive of VAT and fixed and firm. Delivery will be direct to the relevant City Power store.
The scope of work entails supply and delivery of the following computer equipment and accessories.
Item
No. Description Unit Price Total
1. Assessment of existing electricians trade test panels
SUB TOTAL
VAT
TOTAL
Closing date 12/01/2014 and time 11:00 AM for submission of quotation:
Vendors must supply written quotations that reflect the following information on the quotation:
• Quotation Validity Period:
_____
• Delivery period:
_____
• Company Name:
_____
• Company Registration Number:
_____
• VAT Registration Number:
_____
• Physical Address:
_____
• Contact Person:
_____
• Telephone Number:
_____
• Fax Number/Email Address:
_____
• BBB-EE certificate
_____
• Company Income Tax Number (i.e. SARS No):_____
• Tax Clearance Certificate Attached or consent for City Power to ascertain from SARS

whether your status is in order:
• Signed disclaimer (Attached to this RFQ):_____
2. Calculation of points for B-BBEE status level of contributor
. B-BBEE Status Level of Contributor
Number of points (80/20 system)
1 20
2 18
3 16
4 12
5 8
6 6
7 4
8 2
Non-compliant contributor
0
CP Reference Number:
Disclaimer: Supplier ( ) hereby warrants that he/she/it has:
(Name of supplier)
1. Read, fully understood and hereby accept City Power's standard quotation Terms & Conditions as published on the official City Power website;
2. Submitted a true and accurate declaration of interests reflecting that the supplier has no immediate family relations and that none of its shareholders, directors, managers or stakeholders are in the employ of City Power or the state currently and that no such relatives, shareholders, directors, managers or stakeholders have been so employed in the previous 12 months;
3. Undertakes to complete a fresh declaration of interests should these circumstances have changed as at date of this quotation. (This declaration is obtainable from the City Power's website/ Commodity Managers and the abovementioned contact person).
Name, Date & Signature of Supplier
(Person responsible for the Quote)
Name:
Signature:
Date
PLEASE SUPPLY THE FOLLOWING

DOCUMENTS TO ENABLE US TO EVALUATE YOUR SUBMISSION:
1. VALID TAX CLEARANCE CERTIFICATE
2. VALID BBBEE CERTIFICATE
3. SIGNED DECLERATION OF INTEREST FORM (MBD4)
MBD 4
DECLARATION OF INTEREST
1. No bid will be accepted from persons in the service of the state*.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.
3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.
3.1 Full Name: ……
……
3.2 Identity Number: ……
……
3.3 Company Registration Number: ……
……
3.4 Tax Reference Number: ……
……
3.5 VAT Registration Number: ……
……
3.6 Are you presently in the service of the state* YES / NO
3.6.1 If so, furnish particulars.
……
……
……
……
3.7 Have you been in the service of the state for the past twelve months? YES / NO
……

……
……
……
∗ MSCM Regulations: "in the service of the state" means to be –
(a) a member of –
(i) any municipal council;
(ii) any provincial legislature; or
(iii) the national Assembly or the national Council of provinces;
(b) a member of the board of directors of any municipal entity;
(c) an official of any municipality or municipal entity;
(d) an employee of any national or provincial department, national or provincial public entity
or constitutional institution within the meaning of the Public Finance Management Act,
1999 (Act No.1 of 1999);
(e) a member of the accounting authority of any national or provincial public entity; or
(f) an employee of Parliament or a provincial legislature.
3.8 Do you, have any relationship (family, friend, other) with YES / NO persons in the service of the state and who may be involved
with the evaluation and or adjudication of this bid?
3.8.1 If so, furnish particulars.
……
……
……
……
……
……
3.9 Are you, aware of any relationship (family, friend, other) YES/ NO between a bidder and any persons in the service of the
state who may be involved with the evaluation and or
adjudication of this bid?
3.9.1 If so, furnish particulars
……
……
……
……
3.10 Are any of the company's directors, managers, principal YES / NO
shareholders or stakeholders in service of the state?
3.10.1 If so, furnish particulars.
……
……
……

……
3.11 Are any spouse, child or parent of the company's directors, YES / NO managers, principal shareholders or stakeholders in service
of the state?
3.11.1 If so, furnish particulars.
……
……
……
……
CERTIFICATION
I, THE UNDERSIGNED
(NAME) ……
……
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS
CORRECT.
I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION
PROVE TO BE FALSE.
…… ……
……
Signature Date
…… ……
……
Position Name of Bidder

SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 30 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET: HORIZONTAL/VERTICAL MOUNTING
SAP 349
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:
_____
_____
Tenderer's Authorised Signatory:

_____
Name in block letters Signature
Full name of company:

_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 31 OF 31
ANNEXURE D – STOCK ITEMS
Material Group: ELECTRICAL ACCESSORIES
Item SAP No. SAP Short Description SAP Long Description
1 3551 PANEL PORTABLE EARTH EQUIPMENT
PANEL PORTABLE EQUIPMENT FOR EARTHING OR EARTHING AND SHORT CIRCUITING FOR PANELS SUITABLE FOR NOMINAL VOLTAGES, 400V TO 33 KV. SPECIFICATION NO. CP_TSSPEC_108.
2 3561 OVERHEAD LINE PORTABLE EARTHING GEAR
OVERHEAD LINE PORTABLE EARTH GEAR FOR USE ON LV AND MV LINES, FOUR INTER-PHASE CONDUCTOR, WITH LENGTH OF 1.5 M EACH, AND SINGLE EARTHING CONDUCTOR OF 13 M LONG.
3 3562 HIGH VOLTAGE PORTABLE EARTHING GEAR
HIGH VOLTAGE EARTH EQUIPMENT, 6MM LONG, FOR USE ON SYSTEM VOLTAGES, 6.6 TO 132 KV FOR EARTHING AND SHORT CIRCUITING THREE PHASE DEVICES TO GROUND. SPECIFICATION CP_TSSPEC_108
4 6636 MAGNEFIX EARTHING KITS
PORTABLE MAGNEFIX EARTHING KITS, TO CONNECT ISOLATED APPARATUS DIRECTLY TO GROUND FOR SAFE DISCHARGE. CP_TSSPEC_108.
5 3565 INTERSWITCH EARTHING KITS
INTERSWITCH PORTABLE EARTHING KITS TO ISOLATE APPARATUS DIRECTLY TO GROUND TO ENSURE SAFE DISCHARGE OF ELECTRICAL ENERGY AT ALL TIMES. SPECIFICATION NUMBER: CP_TSSPEC_108
6 3563 EQUIPOTENTIAL EARTHING FOOT PLATE
EQUIPOTENTIAL EARTHING FOOT PLATE 6MM THICK AND 500 X 700 MICRO, WHICH AN OPERATOR STANDS ON, WHILE IN CLOSE PROXIMITY TO LIVE APPARATUS, TO CREATE EQUIPOTENTIAL ZONE.SPECIFICATION NO. CP_TSSPEC_108
7 3564 FIXED EARTHING BALL JOINT
FIXED EARTHING BALL JOINT, TINNED COPPER, 6 MICRO METRE AND 25 MICRO METRE THICKNESS FOR SAFE EARTHING TO THE GROUND. SPECIFICATION: CP_TSSPEC_108
8 6165 INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG
INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG, 6.6-12KV, 450 A. SPECIFICATION NO. CP_TSSPEC_108
9 349 BRACKET: HORIZONTAL / VERTICAL MOUNTING
BRACKET: HORIZONTAL/VERTICAL MOUNTING. SPECIFICATION: CP_TSSPEC_108

5
ANY ENQUIRIES REGARDING THE BIDDING PROCEDURE MAY BE DIRECTED TO:
Municipality / Municipal Entity: City Power
Department: Supply Chain Management
Contact Person: Ndivhuwo Mamphaga
Tel: 011 490 7634
Fax: 011 870 3717
E-mail: nmamphaga@citypower.co.za
ANY ENQUIRIES REGARDING TECHNICAL INFORMATION MAY BE DIRECTED TO:
Contact Person: Ndivhuwo Mamphaga
Tel: 011 490 7634
Fax: 011 870 3717
E-mail: nmamphaga@citypower.co.za
REPORT FRAUD AND CORRUPTION TO EITHER OF THE FOLLOWING

SERVICES;
TOLL FREE – 0800 002 587
FAX – 0800 007 788
E-mail: anticorruption@tip-offs

F1.1 The employer is City Power Johannesburg (SOC) Ltd
F1.2 The tender documents issued by the employer comprise:
Part 1: Tendering procedure
1.1 Invitation to Bid (MBD 1)
1.2 Application for Tax Clearance Certificate (MBD 2)
1.3 Tender data
1.4 CIDB Standard conditions of tender (updated July 2015)
Part 2: Pricing data
2.1 Pricing instruction
2.2 Non-Firm Prices Form (MBD 3.2)
2.3 Price Schedule
Part 3: Agreements and contract data
3.1 Form of acceptance
3.2 Contract data
3.3 Formal contract (MBD 7.1)
Part 4: Returnable documents
.1 Returnable documents required for evaluation purpose
• Municipal Rates and Taxes (Not in arrears for more than 90 days)
• SHERQ Regulations
• Invitation to Bid (MDB 1)
• Declaration of Interest Form (MBD 4)
• Declaration for Procurement above R10 000 000 (MBD 5)
• Preference Claim Form (MBD 6.1)
• Declaration Certificate for Local Content (MDB 6.2)
• Annexure C, D & E (Please refer to DTI website for further clarity)
• Declaration for Purchase of Goods (MBD 7.1)
• Declaration of Bidder’s past SCM practices (MBD 8)
• Certificate of Independent Bid Determination (MBD 9)
• B-BBEE Certificate or Sworn Affidavit
• Valid Tax Clearance Certificate or SARS Pin
• Financial Statements for the past three years
• Central Supplier Database (CSD) Registration Report
• Additional soft copy of the Bid Document must be submitted on Memory Stick
4.2 Other documents required for evaluation purpose
4.3 Documents that will be incorporated in the contract
Part 5: Scope of work
5.1 Evaluation Criteria
5.2 Bill of Quantities
5.3 Specifications
. NON-FIRM PRICES SUBJECT TO ESCALATION
1. IN CASES OF PERIOD CONTRACTS, NON FIRM PRICES WILL BE ADJUSTED (LOADED) WITH THE
ASSESSED CONTRACT PRICE ADJUSTMENTS IMPLICIT IN NON FIRM PRICES WHEN CALCULATING THE
COMPARATIVE PRICES
2. IN THIS CATEGORY PRICE ESCALATIONS WILL ONLY BE CONSIDERED IN TERMS OF THE FOLLOWING
FORMULA:□ □
VPt
oR
tR
D
oR
tR
D
oR
tR
D
oR
tR
DPtVPa □□
□
□
□
□
□ □□□□□ 4
4
4
3
3
3
2
2
2
1
1
11
Where:
Pa = The new escalated price to be calculated.
(1-V) Pt = 85% of the original bid price. Note that Pt must always be the original bid price
and not an escalated price.
D1, D2.. = Each factor of the bid price eg. labour, transport, clothing, footwear, etc. The total of

the various factors D1,D2 etc. must add up to 100%.
R1t, R2t…… = Index figure obtained from new index (depends on the number of factors used).
R1o, R2o = Index figure at time of bidding.
VPt = 15% of the original bid price. This portion of the bid price remains firm i.e. it is not
subject to any price escalations.
3. The following index/indices must be used to calculate your bid price:
Index……. Dated……. Index…….
Dated……. Index……. Dated…….
Index……. Dated……. Index…….
Dated……. Index……. Dated…….
4. FURNISH A BREAKDOWN OF YOUR PRICE IN TERMS OF ABOVE-MEN 2
33 SHER FILE ……. 20
34 HOURS OF WORK…….. 20
SECTION 37(1) AGREEMENT ……. 21
3
SHER SPECIFICATION FOR LUTZ CABLE PROJECTS
1 INTRODUCTION
1.1 Project and scope of work details
It is the intention of these projects to construct:
1. Double circuit, 200MVA firm, 88kV cable supply between the Eskom's Dalkeith Substation
and City Power's new Lutz Substation consisting of 6 x single core, 2500mm² Aluminium
XLPE cables.
2. Ramp for access into Dalkeith Substation with ducts to protect the cables entering the
substation.
The above work will consist of civil and electrical construction works at ground level and also at
heights. Work will, in some cases, take place in close proximity of existing electrical installations of voltages up to 88kV.
1.2 Project accountabilities and responsibilities
i) The principal contractor is responsible for adequately informing and training his/her employees
and subcontractors of all relevant information of the City Power-issued work information, SHER specifications, and the principal contractor's SHER plan.
ii) Employees are responsible for their own health and safety and that of their co-workers in their
area. They must be made aware of their responsibilities during induction and awareness
sessions, some of which are:
- familiarising themselves with their workplaces and health and safety procedures;
- working in a manner that does not endanger them or cause harm to others;
- ensure that work area is kept tidy;
- reporting all incidents/accidents and near misses;
- protecting fellow workers from injury;
- reporting unsafe acts and unsafe conditions;
- reporting any situation that may become dangerous; and
- Carrying out lawful orders and obeying health and safety rules.
- Be aware of pedestrians, traffic and external interferences.
iii) Every person responsible under Section 16.1 and Section 16.2 must have undergone general
City Power SHER induction training before work commences under their auspices, and every
employee of the principal contractor, subcontractor, and employer's staff involved in the project
must undergo site induction that will be provided by the principle contractor before entry onto
site, commencement of the contracted work, and for specific tasks. Principal contractor and subcontractor employees shall have documented verification of completed induction training.
Please note that casual workers are also employees that will be treated under all the
legislative requirements, standards, procedures and rules of permanent employees.
iv) It must be highlighted to all employees that anyone who becomes aware of any person

disregarding a safety notice, instruction, or regulation shall immediately report this to the person concerned. If the person persists, stop the person from working, and report the matter to the City Power project coordinator, clerk of works, consultant or the principal contractor supervisor immediately. **v) No person shall damage, alter, remove, render ineffective, or interfere with anything that has been provided for the protection of the site or for the health and safety of persons.** **4** **vi) No person under the influence of alcohol, drugs, or medication (in a state of intoxication) or any other condition that may render him/her incapable of controlling himself/herself or other persons under his/her charge shall be allowed to enter the site.** **vii) All safety and warning signs must be obeyed at all times.** **viii) Entering or leaving the site may only be done via the official designated walkways; do not take short cuts. Follow designated walkways to and from your workplace. Walk, do not run, and be alert to motor vehicle traffic and mobile equipment.** **ix) All employees must adhere to the SHER and other site-specific rules.** **x) If any of the principal contractor's employees or his/her subcontractor employees have transgressed any of the requirements of the SHER specification, SHER plan, or site rules, then the employee will be removed from site and his/her site access revoked. The principal contractor must follow a process of disciplinary action, which shall include retraining/inducting the employee (at the cost of the principal contractor), and provide proof thereof to the City Power site/project manager. On the satisfaction of the City Power site/project manager, the employee will be allowed back on site.** **2 LEGAL AGREEMENT** **In terms of section 37(2) of the OHS Act, it shall be required of every contractor to sign an agreement**				**with City Power.** **REFER TO ANNEXURE 1 - 37(2) agreement.** **3 CLIENT AND CONTRACTOR ORGANISATIONAL STRUCTURES** **Client organisational structure for this project – To be submitted** **Contractor - To be submitted** **4 APPOINTMENTS** **- OHS Act: section 16(1) Employer** **- OHS Act: section 16(2) Employer** **- OHS Act: GMR 2(1) Supervisor of Machinery** **- OHS Act: GMR 2(7) Supervisor of Machinery Assistant** **- OHS Act: section 17 Health and Safety Representative** **- OHS Act: GSR 3 First-aiders** **- OHS Act: DMR 17(2) Goods Hoist Inspector** **- OHS Act: GAR 9(2) Incident/Accident Investigator** **- OHS Act: EMR 9 Portable Electrical Equipment Inspector** **- OHS Act: CR 4(1)(c) Appointment of the Contractor by the City Power Client (to be done when contract is awarded)** **- OHS Act: CR 5(3)(b) Subcontractor Appointment by the Contractor (if appointing subcontractors)** **- OHS Act: CR 6(1) Construction Supervisor (appointed by the contractor's OHS Act section 16.2 assignee)** **- OHS Act: CR 6(2) Assistant Construction Supervisor (appointed by the contractor 16.2 appointee)** **- OHS Act: CR 6(6) Construction Health and Safety Practitioner** **- OHS Act: CR 7(1) Person to Compile Risk Assessments** **5** **- OHS Act: CR 8(1)(a) Competent Person to Compile Fall Protection Plan** **- OHS Act: CR 11(1) Person to Supervise Excavation Work** **- OHS Act: CR 15(1) Suspended Platform Supervisor** **- OHS Act: CR 17(1) Material Hoist Inspector** **- OHS Act: CR 18(1) Batch Plant Supervisor** **- OHS Act: CR 21(1)(j) Construction Vehicle and Mobile Plant Inspector** **- OHS Act: CR 22(e) Temporary**		

Electrical Installation Controller **- OHS Act: CR 26(a) Stacking and Storage Supervisor** **- OHS Act: CR 27(h) Fire fighting Equipment Inspector** **- City Power requirement – Emergency Planning Co-coordinator** **- City Power requirement – Fire official** **- Environmental officer – each contractor shall appoint and provide a full-time suitably qualified and competent environmental officer (EO) for the duration of the work, with a minimum average ratio of one EO per 500 employees if there are ROD conditions to comply with.** **- High Voltage Regulations Appointment – Responsible and authorised persons to undergo training and be appointed.** **5 COMPETENCE AND TRAINING** **- To use a Compactor – On job training** **- Drilling with Augur – Drilling course** **- Health and Safety Rep Training** **- First Aid Level 2** **- Crane Operator Training** **- RCAT** **- Hazard identification and Risk assessment** **- High voltage regulations** **- FAS Training** **- Fire fighting course** **- Evacuation Procedure** **- Site induction** **The contractor shall ensure that all his/her employees, agents, and contractors have undergone the project safety induction programme prior to commencing work on site. Appropriate time must be set aside for training (induction and other) of all employees.** **Prior to induction, all employees must undergo a pre-employment medical examination and must be found fit for duty. A copy of the certificate of fitness must be presented for permanent record at the site offices for permanent record.** **All employees and visitors on site shall have proof of induction training.** **6 SUBCONTRACTOR MANAGEMENT** **6.1 Contractor accountabilities for their subcontractors** **- When subcontractors are appointed, the contractor shall inform the client/agent and obtain his/her approval.** **- When contractors appoint subcontractors, the contractors would then have the same role and responsibility in relation to the subcontractors as the client/agent has in relation to the principal contractor.** **- Contractors are directly accountable for the actions of their subcontractors. The contractor will also be responsible for initiating any remedial action (recovery plan) that may be necessary to ensure that the contractor complies with all requirements.** **6** **- The principal contractor shall provide any subcontractor who is making a bid or is appointed to perform construction work with the relevant sections of the documented SHER specification, who would, in turn, provide the client/agent with a SHER plan for approval.** **- The contractor shall carry out audits on the subcontractor at least monthly to ensure that his/her SHER plan is being implemented and maintained.** **- City Power may conduct audits on subcontractors. Any non-conformances/ findings/observations found in these audits shall be raised and discussed with the relevant contractor (with whom the subcontractor is contracted).** **- The client/agent shall stop any contractor and/or the contractor shall stop any subcontractor from executing construction work that poses a threat to the safety and health of persons or the environment or non-compliance with the approved SHER plan.** **- Contractors shall have a work coordination process in place that will prevent any conflict occurring between individual site activities and subcontractor activities.** **- The work coordination process provides the management arrangements for reviewing, controlling, and monitoring each subcontractor and his/her individual**							

work packages while he/SHER is present and working on the project site. **- The work coordination process should identify the overall SHER working requirements that a contractor and subcontractor will need to provide to the project to enable assessment of their procedure and controls. The work coordination process will allow the work to proceed without risk to the health and safety of the contractor's personnel, other contractors operating in the vicinity, visitors, delivery personnel, and the client's personnel present on the site.** **NB: NAME OF SUBCONTRACTOR AND PROOF OF COMPETENCY TO BE PROVIDED** **6.2 Subcontractor SHER plan** **The subcontractor shall prepare a SHER plan based on the SHER specifications that shall be provided by the principal contractor. The SHER Plan shall be in line with SHER Specifications provided by the client.** **The SHER plan must detail specific plans and programmes for implementing the health, safety, and environmental requirements of the contract. The SHER plan may be a collection of actual documents and manuals and should include, where applicable, the following as a minimum:** **- The principal contractor(s)' and their subcontractor(s)' SHER policies** **- Indication of competent supervision on site (CVs to be included)** **- Duties and safety responsibilities of all appointed persons on the project** **- Selection, placement, and training procedures, including induction and ongoing training, in "basic safe work" and occupational health and safety training for newly hired or promoted supervisors** **- Occupational health and safety communications and meetings, including daily safe task instructions and project safety meetings** **- Assessment of subcontractors, including requirements for safety plans** **- Safety awareness promotions**			**- Nomination of personnel to carry out safety inspections. The task may be shared with other duties and provided within the resources of individual gangs and may be rotated.** **- Contractor senior management involvement with the company's staff in consultative processes and daily management safety walkabouts** **- Rules and regulations, including safety procedures that the contractor has in place for recurring work activities** **- Control of dangerous and hazardous substances** **- System of hazard identification and risk control, such as risk assessments, daily safe task instructions, and communication** **- Design control (if applicable)** **7** **- Audits to ensure compliance with safety plans** **- Daily site safety inspections and audits. The auditing role may be shared with other duties or provided within the resources of individual groups. The role may be rotated.** **- Inspection of plant, tools, and equipment prior to introduction to site and regularly thereafter** **- Accident incident reporting, recording, investigation, and analysis, which ensure that corrective action is taken and that this action is communicated to report initiators** **- Medical and first-aid arrangements** **- Evacuation and emergency planning** **- Rehabilitation procedures that encourage an early return to work** **- Substance abuse programme** **- Record keeping, including details of what is kept and for how long** **- Detailed financial allocation for health and safety** **- Monitoring mechanisms** **- Site meeting arrangements** **- Audit arrangements** **- Maintenance arrangements of machinery and equipment** **- Designer interaction arrangements** **- Workers' welfare facilities** **- Arrangements for induction and toolbox talks** **- Training arrangements** **- Letter of good standing with a**		

compensation insurer
- Performance review and improvements on the project
- Past health and safety performance statistics of the company (at least two years)
- Applicable standards, legislation, and guidelines to be adopted
- Details of the interface between the client/agent and the contractor
- Specific procedures, methods, and work instructions to be applied
- Personal protective equipment provision and rules
- Transport safety
- Occupational health and hygiene arrangements, including, but not limited to respiratory and hearing protection, alcohol and drug policies, health assessments, smoking, and first aid
- Management of subcontractors – the client/agent requires the same from subcontractors as it does from contractors
- Training and competence regarding SHER
- Legal appointments
- Medical examinations for all employees
- Working hours – compliance with Labour Relations/Basic Conditions of Employment Act
7 FORUMS FOR SHER COMMUNICATION
The principal contractor(s) and their subcontractor(s) will have to provide a communication strategy outlining how they intend to communicate SHER issues to their staff, the media they will employ, and how they will measure the effectiveness of their SHER communication.
Matters that are discussed include, but are not limited to the following:
- Accident/safety incidents
- Accident investigations (including near misses) and close-out of recommendations
- Audit findings and close-out
- Hazardous materials/substances
- Work procedures
- Protective clothing/equipment
- Housekeeping
8
- Work permits
- Non-conformances
- Emergency preparedness
- Traffic control

- Medicals
- Training
- Forthcoming high-hazard activities
- General SHER issues
- Matters arising from contractors' SHER meetings
- Toolbox Talks
- Incident Case studies
NB: MINUTES OF ALL COMMUNICATION TO BE KEPT ON FILE
8 LEGAL COMPLIANCE
It is the duty of the contractor to ensure that he is familiar with the required SHER legislation.
Non-conformances
The client/agent is entitled to stop work and issue non-conformance reports whenever health, safety, or environmental violations are observed for both contractors and/or their subcontractors.
9 CONTRACTOR'S SITE FACILITIES
The contractor must outline how the site facilities should be managed. This should include, but not be limited to the following:
- Temporary facility layout plan
Not included in this project
- Dining room facilities
Not relevant for this project
- Change rooms
Provide Hut on site
- Ablution facilities
Sanitation facilities shall be provided for Men and women
- Site Sheds, offices, and amenities
A suitable site meeting office must be provided.
- Lay-down and storage
Poles must be properly stacked, supported and stored in a manner that will not endanger people.
Other equipment must be stored/stacked properly and demarcated around each type of equipment
- Site access
Access control register at the gate of the site/store
- Temporary site services
Physical barricading for all open trenches and holes that are left open without someone in attendance.
9
Such barricading shall be at least 1 meter high and made visible through signs and warning

lights if it is during poor visibility
□ Installation and maintenance of temporary construction electrical supply, lighting, and equipment
As required
□ Adjacent land uses/surrounding property exposures
Proper barricading and signage of construction taking place.
□ Boundary and access control/public liability exposures (remember: the employer is
also responsible for the OH&S of non-employees affected by his/her work activities)
Proper access control – Everyone on site shall have their names on the workers register
Proper barricading and signage of construction taking place.
□ Health risks arising from neighbouring as well as own activities and from the
environment, for example, threats by dogs, bees, snakes, lightning, allergies, etc.
Dogs in the area.
Dust resulting from Digging, Drilling and excavation
Noise resulting from Digging, Drilling and excavation
Illegal connections – Electrical contact
10 PROJECT AND SITE RULES
The following basic safety rules should be taken into consideration:
□ Approved hard hats and safety glasses.
□ Steel-toe/safety-toe work boots.
□ Additional eye protection shall be worn when job-specific hazards dictate especially when
drilling, digging and excavating with machinery.
□ Hearing protection shall be worn when entering all operations areas and areas posted as
hearing protection areas or when using equipment that produces noise levels in excess of 85
decibels especially when drilling, digging and excavating with machinery
□ Respiratory protection shall be worn when performing tasks that dictate the need for such
equipment especially when drilling, digging and excavating with machinery

□ Good housekeeping practices shall be continually maintained and work areas left in a clean
and safe condition at the end of each shift.
□ Smoking policy: smoking is permitted in designated areas only.
□ Risk assessment will be performed and discussed every morning with all staff present at the
job.
□ Only trained, certified personnel shall operate aerial lifts, forklifts, motorised equipment,
drilling machines and excavating equipment.
□ Ladders must be properly constructed and kept in good repair. Ladders shall be the proper
length and type for the task. All ladders shall be identified, registered and inspected monthly.
□ A fall protection plan shall be developed with the minimum requirements that will include inter alia:
□ Training
□ Equipment u 14
□ The training should have been done according to the code of practice by a provider
registered with the Department of Labour.
□ Before using any lifting machines or tackle, the operator should inspect it/them.
□ All lifting machines shall be examined and subjected to a performance test by an accredited person/company at intervals not exceeding 12 months.
□ All lifting tackle should be examined by an accredited person/company at intervals not exceeding three months.
□ Refer to the requirements of the Driven Machinery Regulation 18 and Construction
Regulation 17 and 20 of the OHS Act.
□ All lifting tackle should be recorded in a register.
□ All hooks shall be fitted with a safety latch/catch.
□ A management control system should be implemented to ensure that only an operator who is
competent can draw lifting machines and forklifts.
□ All lifting tackle should be conspicuously and clearly marked

with identification particulars and the maximum mass load for which it is designed.
□ No person shall be moved or supported by means of a lifting machine, unless such a machine is fitted with a cradle approved by an inspector.
□ A risk assessment should be conducted prior to starting with the task.
□ Account should be taken of wind forces.
□ Lifting machines are erected taking into account a safe distance from excavations.
□ When working in close proximity to power lines, the contractor must apply for a permit. Refer to City Power Plant Safety Regulations and/or Operating Regulations for High-voltage Systems and Electrical Machinery Regulation 15 of the OHS Act.
□ Account should be taken of the bearing capacity of the ground.
Principal contractors and their employees shall keep out from under suspended loads, including excavators, and between a load and a solid object where they might be crushed if the load should swing or fall. They shall not pass or work under the boom or any crane or excavator, Suspended loads that are lifted must be guided with ropes and no person is allowed to guide any load by hand.
19 WORKING AT HEIGHT
CONTRACTOR TO PROVIDE A FALL PROTECTION PLAN
The fall protection plan shall include a task-/job-specific risk assessment and requirements relating to the following:
□ Training programme for employees working from a fall risk position
□ Appointments and authorisations
□ The procedure addressing the inspection, testing, and maintenance of all fall protection equipment
□ The processes for evaluation of the employees' medical fitness necessary to work in a fall risk position and the records thereof (medical surveillance programme)
□ Equipment use and specification
□ Fall prevention, fall arrest, and fall rescue

□ Method statements or safe work procedures/task analysis/work instruction
20 EXCAVATIONS, TRENCHES, AND FLOOR OPENINGS
Requirements in Construction Regulation 11 of the OHS Act shall apply.
□ Digging, excavation, or driving a peg, pile, or spike into the ground by the contractor may not commence without written authorisation from the client's/agent's representative.
□ Prior to commencing work on any excavation or trench, utility owners shall be contacted and advised of the proposed work and to determine the location of all underground installations, 15 that is, sewer, telephone, water, fuel, electric, etc. Overhead hazards shall be assessed and dealt with prior to commencement of work.
- Adequate precautions shall be taken by the contractor to prevent slumping of excavations, as well as to prevent rocks and loose material falling onto workers.
- All excavations done by the contractor are to be clearly demarcated and barricaded to prevent accidental access.
- Only solid barricading will be used in areas where a fall hazard is present. Solid barricading and/or hole covers shall be provided around all holes or openings to prevent any person being injured as a result of a fall. Danger tape may only be used as a pre-warning to make the solid barricading more visible and to prevent persons from coming close to the danger area.
- Barricading must be placed as close as reasonably possible to the excavation.
- If an excavation or trench endangers the stability of buildings or walls, shoring, bracing, or underpinning will be provided. Excavations and trenches that are adjacent to backfilled excavations or trenches, or that are subject to vibrations from railroad traffic, road traffic,

blasting, or the operation of machinery (for example, shovels, cranes, trucks), must be secured by a support system, shield system, or other protective system.
- Where it is impracticable to provide fixed guard railing, effective removable barriers shall be provided at all unguarded openings in guard railings or floors, and these shall be maintained in position at all times until the hazard no longer applies.
- Warning signs and flashing warning lights at night shall be displayed in suitable positions to warn any persons approaching the area of the location and extent of any excavation.
- No material to be within 3 m of the excavation edges.
- All excavations must be on register and inspected daily before work commences and after inclement weather by the contractor's appointed competent person, declared safe, and his/her findings noted in the said register. Client/agent to review the said register on a predetermined frequency not exceeding seven (7) days.
- While work is being performed in an excavation, there shall be a supervisor at all times.
- Every twelve meters, there shall be an escape ladder in all excavations.
- Requirements in Construction Regulation 11 of the OHS Act shall apply as well.
- No work shall commence in an excavation, unless the excavation has been declared safe by the competent person.
21 EXPLOSIVES
Requirements of the Explosives Regulations of the OHS Act shall be adhered to.
A copy of the written permission from the Chief Inspector of the Department of Labour shall be obtained before use of any explosive material – refer to the requirements in Explosives Regulation 13 of the OHS Act.
Requirements for the transporting and storage of explosives to be in accordance with Explosives Regulation 13.4 of the OSH Act and SANS 100228 "Code of Practice for the Identification and Classification of Dangerous Substances and Goods" (published by the South African Bureau of Standards).
Should blasting be necessary during the construction phase, the necessary authorisation must be secured from the relevant local municipality. Adjacent landowners must be notified prior to the blasting activities on site.
The construction operations may necessitate that ground and rock be blasted. Prior to a blast, a siren will have to be sounded. Warning flags will have to be displayed at the entrance to the area of the blast, and guards will be placed at strategic points.
16
Should the contractor be required to carry out blasting operations, he/she is to fully acquaint himself/herself with, and adhere to, the blasting procedures and legislation. Every blast must be cleared with the appropriate client's/agent's representative before charges are placed.
Only a licensed operator is allowed to blast.
22 PERMIT TO WORK
Contractors must adhere to the approved City Power permit-to-work system to control identified high-risk activities
If the type of work requires that contractors must be trained, competence-assessed, and authorised in writing to perform the duties of an authorised or responsible person as contemplated in the applicable City Power regulations, for example:
- Operating Regulations for High-voltage Systems;
- Plant Safety Regulations;
- confined space work.
The client's/agent's representative is to provide more details on the permit-to-work system for the specific work to be conducted by the principal contractor.
23 WORKING NEAR PUBLIC ROADS
23.1 PUBLIC SAFETY RISK PLAN TO BE PROVIDED
Necessary precautionary and preventive safety measures shall be taken where persons are required

to work on or near roadways. Consideration shall be given to the wearing of high-visibility vests, and protection by red cones or flags during daylight and use of red or amber flashing lamps at night.
Work areas must be adequately barricaded so as to prevent unauthorised access.
Road traffic warning signs shall be placed well ahead of the work area.
24 WORK STOPPAGE
The conditions that lead to work stoppages are based on:
- management of change – this is when there are changes to the work environment (for example, climatic changes) and construction work (for example, modifications to the design), in any phase of the construction project, and/or amendments with regard to City Power rules and regulations and/or legislative amendments;
- unsafe acts/behaviours; and
- Unsafe conditions.
- Injury or fatality
The process to be followed is:
- The relevant activity must be stopped.
The City Power site/project manager and/or principal contractor and his/her subcontractors shall immediately remove the workforce from the work area and correct the health and safety deficiencies by allowing only the people in the area who are competent to make the area safe.
The principal contractor and his/her subcontractors shall ensure that no other work is being performed during this time. Should the estimated time from the outset to make the area safe where life-threatening/imminent danger situations exist, then the area shall be suitably barricaded and signposted with the wording "Unsafe Area – Authorised Access Only".
The City Power site/project manager shall review the affected parts/sections of the SHER specification with the purpose of providing sufficient SHER information to the principal contractor.
17
The principal contractor shall then revise the relevant sections in the SHER plan to accommodate the changes.
The City Power site/project manager must ensure that the revised provisions in the SHER plan are adequate and must approve them before the work activity is commenced.
Before the workforce is allowed back in the area, the principal contractor and his/her subcontractors shall ensure that:
- the area is re-inspected by the contractor safety practitioner and supervisor and note corrective actions taken; and
- declare the area safe for work by signing off on the "work stoppage" notice issued by the City Power site/project manager.
Refer to the requirements of Construction Regulation 4(e) of the OHS Act.
25 HAZARD AND RISK MANAGEMENT
The aim of this section is to do the following:
- Highlight the construction site SHER risks and hazards (reference must be made to the EIA (Environmental Impact Assessment), EMP (Environmental Management Plan), ROD (Record of Decision), and the client's/agent's baseline hazard identification).
- Request the contractor and his/her subcontractors to identify hazardous and potentially hazardous work operations. The contractor needs to demonstrate that the site hazards and the contractor's activity risks and the mitigating measure have been considered in his/her risk assessments.
- There must be method statements or written safe work procedures for all the contractor activities.
- Emerging risks and hazards must be managed during construction work.
- The Management of Bees should be included in the EMP and Impact and Aspect register.
Activity-based risk assessments must be conducted by an appointed and competent person of the contractor.
Preliminary hazard identification

shall be conducted by the contractor prior to work beginning on site.

25.1 SAFE WORK PROCEDURES AND PRACTICES

There must be written safe work procedures for all activities. Risk assessments should refer to the safe work procedures.

The safe working procedure should identify:

- The level of supervision required for the task

- The training and qualifications required by the workers to perform the task

- the supervisor for the task or job and the employees who will undertake the task;

- the tasks that are to be undertaken that pose risks;

- the equipment and substances that are used in these tasks;

- the control measures that have been built into these tasks;

- the personal protective equipment to be worn; and

- actions to be undertaken to address safety issues that may arise while undertaking the task.

25.2 HIGH-RISK ACTIVITIES

When the principal contractor and/or his/her subcontractors are working in an area where a high health and safety hazard exists, the principal contractor shall take additional precautions.

Dust Mask – Dust mask shall be provided for each person

Noise – Baseline and periodic audiometric testing for each person

18

Working on heights – FAS shall be used

26 SHER PLAN

The SHER plan must detail specific plans and programmes for implementing the health, safety, and environmental requirements of the contract. The SHER plan may be a collection of documents and manuals and should include, where applicable, the following as a minimum:

- SHER policies

- Applicable standards, legislation, and guidelines to be adopted

- Commitments to government approvals and project licences

- SHER objectives

- Allocation of responsibilities and authorities

- Details of the interface between the client/agent and the contractor

- Specific procedures, methods, and work instructions to be applied

- Risk assessments

- Safety awareness promotions

- Personal protective equipment provision and rules

- Rehabilitation procedures to encourage an early return to work

- Transport safety

- Occupational health and hygiene arrangements, including, but not limited to respiratory and hearing protection, alcohol and drug policies, health assessments, smoking, and first aid

- Monitoring of employee exposure to occupational stressors as identified in the risk assessments

- Safety meeting schedules

- Management of subcontractors – client/agent requires the same from subcontractors as it does from contractors

- Training and competence regarding SHER

- Incident reporting, investigation, and recording

- Audit, review, and management feedback

- Letter of good standing – Workmen's Commissioner

- Legal appointments

- Medical examinations for all employees

- SHER personnel presence on site

- Crisis and emergency response arrangements

- Maintenance, inspection, and testing of construction vehicles, machinery, equipment, and substances

- Working hours – compliance with Labour Relations/Basic Conditions of Employment Act

- The SHER plan shall be submitted to the client/agent for review and approval and, once accepted, shall not be amended without prior consultation and acceptance by the client/agent.

27 EMERGENCY PREPAREDNESS

The contractor(s) shall develop a site-specific emergency preparedness plan to take into consideration an adequate level of

preparedness, response, and recovery to prevent or minimise the impact of an emergency situation pertaining to human life and property.
The emergency preparedness plan must address all the geographic locations where project work scope is undertaken and where project personnel are sent.
19
28 FIRE RISK MANAGEMENT
Contractors must develop a fire safety procedure for the specific construction site prior to commencing work. The procedure must take into consideration the size of the site, the type of work being done (for example, cutting, welding, grinding, etc.), and the amount of combustible materials. It must be developed in accordance with the hot work permit of the City Power Plant Safety Regulations, City Power fire risk management requirements, and all other applicable regulations. All workers entering and working on the construction site need to be trained in fire safety and any duties they are required to perform. Pre-existing fire systems in buildings shall be maintained during construction whenever possible. Any changes must be approved by the client/agent.
29 ENVIRONMENTAL MANAGEMENT
Contractors shall ensure duty of care towards the environment by:
- Reference to the project environmental management plan (EMP).
- ensuring compliance with all environmental legislation (zero legal contraventions);
- ensuring compliance with all City Power environmental policies, procedures, guidelines, etc.;
- ensuring landowner satisfaction through timeous consultation with landowners; and
- demonstrating environmental competence of staff through appropriate training where their activities could impact on the environment.
- A waste management plan shall be established in order to provide guidelines for the proper storage, handling, and disposal of waste generated by the project during the course of construction.
30 AUDITING
The contractor's SHER plan shall be audited in order to ensure compliance with the requirements of the City Power SHER specifications.
City Power reserves the right to conduct unannounced audits on contractors.
31 INCIDENT MANAGEMENT
The contractor shall have an incident reporting system that is compatible with City Power's requirements and all applicable legislation. Any incident or near miss involving the clients, contractors, or third-party's personnel, property, plant, or equipment shall be reported as soon as reasonably practicable, but not later than 24 hours, to the client's/agent's representative, irrespective of whether injury to personnel or damage to property or equipment resulted.
The contractor shall ensure compliance with City Power incident management processes for reporting and investigation of incidents.
The contractor shall investigate the causes of all incidents and shall within two working days, provide the client/agent with the results of the investigation and recommendations on how to prevent a recurrence.
The client/agent shall have a right to designate a representative to participate in the investigation at the client's/agent's sole discretion.
The principal contractor shall keep on site/at the workplace a record of all accidents and incidents reported in the form of the OHS Act Annexure 1 investigation form as referenced in the OHS Act (Incident Investigation Report).
The principal contractor shall provide SHER-related statistics to the client at the end of each month.
City Power reserves the right to conduct an independent investigation in any incident.
20
32 OMISSIONS FROM THIS SHER SPECIFICATION

By drawing up this SHER specification, City Power has endeavoured to address the most critical aspects relating to SHER issues in order to assist the contractor in adequately providing for the health and safety of employees on site.

Should City Power not have addressed all SHER aspects pertaining to the work that is tendered for, the contractor needs to include them in the SHER plan and inform City Power of such issues when submitting the tender.

33 SHER FILE

The contractor shall also record in the SHER file:

- information about removal or dismantling of installed plant and equipment;

- hands-on information about equipment needing cleaning and maintenance, for future purposes;

- nature, location, and markings of services; and

- as-built drawings.

The file must be kept on site and must be available on request for audit and inspection purposes.

At the end of the contractor's contract, the SHER file shall be handed over to the client/agent

34 HOURS OF WORK

All work conducted on site shall fall within the legal requirements in accordance with the Basic Conditions of Employment Act. The client/agent is to be notified of any exemptions granted in terms of section 50 of the Basic Conditions of Employment Act.

21

Section 37(1) of the OHSA states that whenever a employee does or omits to do any act which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved:

That the employee was acting without the permission of the employer or that the act was not within the scope of authority of the employee or that all reasonable steps were taken by the employer to prevent the act in question.

The Agreement below provides for the above section that the parties agree to ensure compliance to the requirements of the act.

SECTION 37(1) AGREEMENT

WRITTEN AGREEMENT ON OCCUPATIONAL HEALTH AND SAFETY

In accordance with the provisions of section 37(2) of the Occupational Health and Safety Act 85 of 1993

AS ENTERED INTO AND BETWEEN

……

(City Power Division/ Business Unit) (hereinafter referred to as "the Client")

AND

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AS ENTERED INTO AND BETWEEN

……

(City Power Division/ Business Unit)

(hereinafter referred to as "the Client")
AND
.....
(hereinafter referred to as "the Contractor")
a world class African city
TENDER DOCUMENT
Dalkeith - Lutz 132kV Cable
VOLUME 2
Technical Specifications
Tender No. Dalkeith – Lutz 132kV Cable
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1. General Information

1.1 Definitions and Terminology

“Employer” for the purposes of this document shall mean City Power Johannesburg.

“Engineer” for the purposes of this document shall mean City Power’s appointed representative.

“Site” for the purposes of this document shall mean the cable route length and any area affected by the cable works.

All definitions and terminology in the applicable standards and specifications will apply.

1.2 Location of the Works

The Dalkeith - Lutz site is situated in the north western area of Roodepoort.

1.3 Overview of the Works

It is the intention of this project to construct a double circuit, 200MVA firm, at 88kV, cable supply between the Eskom’s Dalkeith Substation and City Power’s new Lutz Substation consisting of 6 x single core, 2500mm² Aluminium XLPE cable system. The approximate route length is 4800 meters.

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The principal features of the Scope of Works do not limit the responsibility of the Contractor. He shall perform all work and furnish all labour, equipment and material to ensure the satisfactory operation of the cable link.

Material and devices that are normally part of the supplied equipment and are essential for the proper operation of all equipment or are necessary for the proper functioning of the whole installation shall be supplied even if not explicitly called for in these Specifications.

The Employer will be responsible for:

a. Operating of the electrical network,

b. Issuing of permits in existing- and energised substations.

c. Cable route servitudes.

The Contractor will provide the following:

a. Any detail designs required to

ensure that the cable rating meets the specified values for the Work indicated below.
b. Final route survey and finalisation of exact cable drum lengths. Off-cuts will be limited to a maximum of 2 meter lengths.
c. All plant, material, transport and labour required for the construction of the works.
d. Commissioning of the works, ready for operation and service.
e. Updated as-built drawings as per specification.
f. Operating and Maintenance Manuals and Training as specified.
g. All wayleave, road closure approvals for the installation.
h. Ensure all wayleave approvals are current.
i. All test equipment to test and commission the installation.
j. All temporary site camps and services.
k. 24 Hour security along the cable route and site camp.
l. A suitable site if soil must be stored temporarily.
1.4 Extent of the Works:
a. Prepare and supply all detail design drawings for cable, earthing, terminations, joints, joint pits, optic fibre works and termination structures.
b. Bulk earthworks for the cable trenching, backfilling and rehabilitation of the construction route.
c. Supply and constructing of road crossings making use of directional drilling as required.
d. Supply and installation of fencing alterations, additional fencing and gates at Dalkeith substation.
e. The supply and construction of an access ramp at the Dalkeith substation.
f. Design, supply and installation of all concrete footings at Dalkeith substation for equipment support structures. (Optional – may be a take-out item).
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tail technical information of the equipment required is specified in the attached Technical Data Sheets. These sheets form part of the technical returnable documents and must be completed in full.
Technical Returnable Documents: See Volume 3.
Drawings: See Volume 4.
Wherever the term standard is used in this specification, this shall mean the latest City Power/ international / national standard in the following order of priority:
• City Power CP_TSSPEC_XXX.
• SANS (South African National Standards).
• NRS (National Rationalisation of Specifications).
• IEC (International Electro-technical Commission).
• IEEE (Institute of Electrical and Electronic Engineers Inc.).
• BS (British Standard).
In case of any contradiction between any of the specifications, technical datasheets and drawings; the order of precedence shall be:
• General and Technical Specification.
• City Power Specifications.
• Technical Datasheets.
• Drawings.
• Other Standard Specifications in the absence of a City Power specification.
Wherever the term goods, material and/or equipment is used it shall mean new, unused and of the most recent or current models, incorporating all recent improvements in design and materials, tested in accordance with the required standard.
All sections of the works must comply with the relevant specifications as referred to in this document. In case of any conflict in requirements it shall be referred in a timely manner, in writing, to the Engineer whose ruling shall be final. A list of the specifications and standards are attached as an Annexure.
2.5 Interchangeability
All items of similar equipment supplied under this Contract must be identical and completely interchangeable.
All auxiliary equipment must also be identical.
2.6 Quality Requirements
It is required that the Contractor has a Quality Management System based on or similar to ISO 9001:2000 in place. Please also take note of the cable and accessories review process as indicated in Annexure 7.
2.7 Material

The Contractor will be responsible to supply, deliver and install all the equipment and material required to perform the work, even though it is not specifically referred to in this specification.
If the Tenderer is in doubt regarding any material or labour item that is not included in the Schedules of Quantities, he must list, cost and price it under "other" in the Schedules of Quantities. Failure to do so will
imply the cost thereof is provided for elsewhere.
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All materials and equipment supplied must be from the suppliers as submitted in the Detailed Technical Specifications. Any change in supplier shall be presented to the Engineer for approval.
All material shall be new and from fresh stock. Should other material be required it should first be presented to the Engineer for approval prior to use.
All material will be handled in the correct and safe manner as not to damage the material. All damaged material
will be for the Contractor's count.
All material and equipment installed must have an established and proven support structure within
South Africa to ensure quick repairs as and when required for maintenance purposes after completion
of the project. The Tenderer must provide proof of the support facilities. The employer reserves the
right to negotiate material and equipment offered before contract award.
2.8 Access to Sites
Access routes to the site shall at all times be kept serviceable, or alternatives shall be provided. These include
road entrances that may have to be kept closed overnight. The cables will be installed, in most cases, inside
the boundaries of private properties. Property owners must have unrestricted access to their properties.
2.9 Site Security

Theft of material can pose a major problem and it is essential that secure stores be erected with fulltime site
security. Security must be provided on the cable route as well. All necessary security and safety precautions
must be taken where the cables run inside private property boundaries. This may include, but not limited to, temporary fencing and or barricading.
2.10 Sheds and Storerooms
The Contractor shall provide, erect and maintain proper sheds for the storage and protection of materials and
Plant, which may be fabricated or brought into the Site. Limited space will be made available at the Lutz substation.
All huts and buildings erected by the Contractor on the Site and not forming part of the Works shall from the
time of their erection until the completion of the Works be the property of the Employer and the Contractor
shall not demolish or remove any buildings or part of any buildings without the written permission of the Engineer. The site facilities and site may not be used for staff accommodation.
On completion of the Works they shall become the property of the Contractor who shall, if so ordered, remove
them entirely with all drains and water mains and restore the surface of the land to its original condition or other reasonable condition, in either case, to the satisfaction of the Engineer.
2.11 Facilities at Base Camp
The Contractor shall provide and maintain all the necessary facilities, including sanitation, along the cable route and base camp site for use by the project staff.
The Contractor shall provide and maintain a site office for progress meetings with the Engineer and Employer
and for the safe keeping of all contract related documentation.
The Contractor shall, during the Contract period, maintain permanent

access to the Employer's/Engineer's office and this access is to be suitable for vehicular traffic under all weather conditions.
A limited three phase 400V/80A capacity temporary LV AC supply may be available at the substation/base camp site.
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The Contractor must:
• ensure that the construction supply complies fully with all the required regulations.
• apply for the temporary building supply.
• provide for all costs associated with the supply and the consumption of electricity for the duration of the project.
• maintain the connection for the duration of the project.
2.12 Site Data
The Tender shall be deemed to have been based on such data on climatic, hydrological and general conditions on the Site and for the operation of the Works as the Employer or the Engineer has made available to the Contractor for the purpose of the Tender, as well as supplementary data obtained independently by the Contractor. The Contractor shall be responsible for his own interpretation of such data and the Employer accepts no responsibility for the sufficiency or accuracy of such data.
2.13 Extension of Time Due To Abnormally Inclement Weather
No extension of time for completion will be granted on count of normal inclement weather, but extension of time in terms of clause 30 of the General Conditions of Contract, arising from abnormal rainfall or wet conditions shall be calculated in accordance with the formula given below, separately for each calendar month or part thereof. Such extension of time shall be calculated for the whole period for completion of the Contract, including any extension thereof.
V = Extension of time in calendar days in respect of the Calendar month under consideration.
Nw = Actual number of days during the calendar month on which a rainfall of Y mm or more has been recorded.
Rw = Actual rainfall in mm for the calendar month under consideration.
Nn = Average number of days, as derived from existing rainfall records on which a rainfall of Y mm or more has been recorded for the calendar month.
Rn = Average rainfall in mm for the calendar months as derived from the rainfall records.
The total extension of time shall be the algebraic sum of the monthly totals for the period under consideration, but if the grand total is negative the time for completion shall not be reduced due to below normal rainfall.
Extensions of time for part of a month shall be calculated using pro-rata values of Nn and Rn.
The factor (Nw - Nn) shall be considered to represent a fait allowance for variations from the average number of days during which rainfall exceeds Y mm. The factor shall be considered to represent a fair allowance for variations from the average in the number of days during which rainfall. Extensions of time for part of a month shall be calculated using pro-rate values of Nn and Rn.
The formula does not take into count flood damage, which could cause further or concurrent delays and this should be treated separately as far as extension of time is concerned.
"Y" shall be taken as 10 m Tender No. Dalkeith – Lutz 132kV Cable
Contractor's and Sub-Contractor's drawings shall not relieve the Contractor from his responsibility for errors or omissions which may exist, even though work is done in accordance with such approved drawings. Where such errors or omissions are discovered later, they shall be made good by the Contractor out of his expenses irrespective of any approval of the Engineer.
The Contractor shall submit for approval a list of drawings/drawing schedule, indicating each kind of drawing per site and the estimated first submission date.
This list of drawings shall be updated

whenever necessary until completion of the work.
All drawings and design data prepared or furnished by the Contractor shall be marked with the title of the work and shall be transmitted to the Engineer. The transmittal of drawings and design data shall be accompanied by a Document Transmittal Sheet (DTS) giving the titles and numbers thereof. The forms of the drawing list and DTS are subject to approval of the Engineer.
Modified drawings shall bear a revision letter and revision date, and the nature of the modification shall be clearly stated, no matter if the drawing was already approved, approved except as noted, revised or not approved.
All drawings shall have a title block incorporating a serial number, issue and revision dates and numbers, and the system subject. The title block shall be to the approval of the Engineer and in accordance with the Employers' requirements. The title shall include the name, the logo and the address of the Employer and the Engineer as per samples available from the Engineer.
All drawings shall be plotted in and shall show the scales of the metric system, and all descriptive wording shall be in the English language.
The construction works shall be carried out only as per approved drawings with all the Engineer's comments incorporated. These drawings shall be clearly and tidily updated with red ink incorporating all changes carried out at site during the erection and testing works. The changed or cancelled items shall not be deleted by eraser or liquid corrector, but crossed only, in order to keep visible the cancelled part. Two sets of these "Marked Up" drawings shall be handed over before the energising of any section of works (one set to the Employer and one set to the Engineer).
Final drawings and technical data sheets of the work as completed, the so-called "as-built" documents, shall be prepared by the Contractor based on the Marked up drawings approved by the Engineer. These documents properly bound in files with separation between the engineering disciplines, i.e. civil lay-out, structural layout (structures, hardware assemblies etc) shall be in sufficient detail to enable the Employer to maintain, dismantle, reassemble, and adjust all parts of the work. Contents of the "as built" documentation and the file arrangement shall be subject to approval by the Engineer.
2.23.1 Documents to be submitted
As far as periods given for submission of documents for information, and of documents for approval are concerned, the times stipulated there are tentative only, thus the Contractor shall submit his own detailed schedule in compliance with his completion periods as per the Contract. The respective modified lists shall be submitted for approval within one month at the latest after Contract signature.
2.23.2 Documents for Information
The following documents shall be submitted by the Contractor for information within the following periods, calculated from the Contract Commencement Date.
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Description	Months
Any particulars required further to documents submitted	1
Proof that the project has been registered with the Department of Labour in terms of the requirements of the Construction Regulations	1 month prior to construction
Proof of competency certificates and appointments of site staff as required by the Construction Regulations	1 month prior to construction
Final Lists of Standards for all equipment, plus the relevant Standards deviating from those Specified.	

1
Cash flow schedule 1
Factory – and internal working drawings 3
Up-to-date:
a. Drawings lists
b. Project progress report
c. Manufacturing progress information
d. Shipment schedules
every month
every month
every 2 weeks
every month
Pro-Forma Operation Manuals and Maintenance books prior to Commissioning
Final "As-built" drawings (hardcopy and in dwg, dxf format) 2 months after
TOC
Final Operation Manuals and Maintenance books 2 months after TOC
2.23.3 Documents for Approval
The following documents shall be submitted by the Contractor for approval within the following periods, calculated from the date of Contract Commencement Date.
Description Months
Detailed programme, charts and progress reports 1
Contractor's standard SHERQ Manual with particulars applicable to the Contract 1
Form of cash flow schedule 1
Civil engineering loadings 1
Detailed dimensional drawings of all equipment 1
Project Quality Plan 2
Risk assessment and Safety Plan in terms of the Construction Regulations. After site establishment but
before
commencement of construction
Cable calculations 2
Manufacturing progress information and schedule for acceptance tests 2
Shipment schedule 2
Factory Inspection schedule 3
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Description Months
Complete technical details and detailed drawings of all equipment 3
Operation manuals and maintenance books 1 month prior to erection
Schedule of factory and site test procedures 2 months prior to commissioning
Schematic Diagrams 6
Final earthing measurements and calculations prior to commissioning
Site test reports working sets prior to completion
tests
Completion test records prior to TOC
As Built drawings- copies of drawings marked up in red colour prior to completion tests
NOTE: In the event of the Contractor failing to submit the mentioned design data and drawings to the satisfaction of the Engineer, the concerned part of the work at site may be interrupted to the full and sole
responsibility of the Contractor and penalties may be applied as per the contract.
All documents, correspondence, etc. shall be distributed in accordance with a Contract Procedure to be agreed
with the Engineer but based upon the following tentative schedule:
DOCUMENT ENGINEER's
OFFICE
SITE
OFFICE
Drawings for Approval 2 0
Approved Drawings 2 1
Drawings for information 1 1
Schedules, Specifications and other documents 1 1
As Built Drawings – Marked-up 1 1
As Built Drawings Final (Prints) 2 0
As Built Drawings – Final, dwg files 2 -
Codes and Standards (whenever applicable) 1 -
Preliminary Manuals for approval 1 -
Approved Final Manuals 1 -
Acceptance Test Procedure for approval 2 1
Approved Acceptance Test Procedure 1 1
Test Reports – Working Sets - 1
Test Reports – Final Sets 1 1
Manufacture Progress information 1 -
Insurance Certificates 1 1
Receiving cum Damage Reports 1 1
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DOCUMENT ENGINEER's OFFICE SITE OFFICE **Weekly Site Labour Register - 1** **Safety Inspections and Minutes 1 1** **Monthly Progress Reports 1 1** **Master Program 1 1** **Correspondence – General 1 -** **Correspondence – Site Matters 1 1** **Payment Invoices 1 -** **DOCUMENT QTY FORMAT ADDRESS FINAL SUBMISSION FOR APPROVAL** **As-Built Drawings 1 Hard Copy Reuven Project Co-ordinator** **All Test Certificates 1 Hard Copy Reuven Project Co-ordinator** **Operation Manuals and Maintenance books 1 Hard Copy Reuven Project Co-ordinator** **Equipment Schedules 1 Hard Copy Reuven Project Co-ordinator** **Differential Protection Fibre Test Report 1 Hard Copy Reuven Project Co-ordinator** **Quality Certificates 1 Hard Copy Reuven Project Co-ordinator** **2.23.4 Documents for submission after completion of project** **The following deliverables shall be distributed in accordance with the following tentative schedule:** **DOCUMENT QTY FORMAT ADDRESS FINAL HANDOVER DOCUMENTS** **Project Close-out report 3 Hard Copy Reuven Planning Engineer** **Project Close-out report 1 Electronic Copy Reuven Planning Engineer** **As-Built Drawings 3 Hard Copy Reuven Planning Engineer** **As-Built Drawings 1 Electronic Copy (AutoCAD format) Reuven Planning Engineer** **As-Built Drawings 3 Hard Copy Reuven Telecom Engineer**		

As-Built Drawings 1 Electronic Copy (AutoCAD format) Reuven Telecom Engineer
All Test Certificates 3 Hard Copy Reuven Planning Engineer
All Test Certificates 1 Electronic Copy Reuven Planning Engineer
Operation Manuals and Maintenance books 3 Hard Copy Reuven Planning Engineer

Operation Manuals and Maintenance books 1 Electronic Copy Reuven Planning Engineer
Equipment Schedules 3 Hard Copy Reuven Planning Engineer
Equipment Schedules 1 Electronic Copy Reuven Planning Engineer
Differential Protection Fibre Test Report 3 Hard Copy Reuven Telecom Engineer
Differential Protection Fibre Test Report 1 Electronic Copy Reuven Telecom Engineer
Quality Certificates 3 Hard Copy Reuven Planning Engineer
Quality Certificates 1 Electronic Copy Reuven Planning Engineer
Handover Certification 3 Hard Copy Reuven Planning Engineer
Handover Certification 1 Electronic Copy Reuven Planning Engineer

2.24 Equipment Inspection and Testing

The Engineer reserves the right to inspect any equipment at the manufacturer's works at any stage during manufacture. The Contractor shall notify the Engineer of any routine or type testing at the factory. Fourteen (14) days' notice of such testing is required. Equipment shall not be despatched from the factory until, final factory testing has been witnessed by the Engineer, or until his authority has been given for despatch.

The direct reimbursable costs for FAT's and inspections outside Gauteng, such as travel expenses, accommodation and per diem, shall be borne by the Contractor. Allowance must be made for two City Power representatives.

Any equipment rejected due to valid technical reasons or failed tests shall be subject to re-testing and/or inspection. The expenses incurred under these circumstances shall be borne by the Contractor. Repetition of tests or inspections will not prejudice the right of the Employer to impose liquidated damages for delay in completion provided elsewhere in the Contract.

2.25 Test Certificates

Copies of all test certificates shall be submitted to the Engineer and shall be included in the substation manual.

The Contractor must provide certificates of compliance for all the applicable electrical installations.

Copies of all commissioning tests shall also be included in the substation manuals.

2.26 Commissioning and Testing

A commissioning test will only be successful once the specified values are attained, irrespective of the number of readings required in the process.

2.27 Manuals and Books

The Contractor shall prepare and submit Operation and Maintenance (O & M) manuals. All instruction sheets shall be properly filed, containing all information description of equipment, diagrams, etc. necessary to enable the Employer to properly operate and maintain the whole of the work including all possible operating procedures.

The various instructions shall be easily intelligible for the operating and maintenance personnel, explaining in various situations what is to be done and why.

The preliminary sets of the Operation and Maintenance Manuals shall be submitted prior to issuing the

provisional handing over certificate by the Engineer. The final submission of the O & M Manuals shall incorporate all comments from the Employer/Engineer to the preliminary manuals.

2.28 Safety

The Contractor must comply with all the requirements of the OHS ACT, Regulations 85 of 1993, any statutory regulations that may be required in terms of this project and the special SHER requirements as per attached annexure 5.

The Contractor shall take all the necessary precautions to ensure the safety of personnel when working on or

near live electrical equipment. The Contractor shall notify the Engineer in advance of all switching or disconnecting of HV equipment. Suitable barriers and warning signs must be erected in areas where personnel or members of the public can

come in close contact with “Live” equipment. Safety Clearances - Substations

The upper edge of any grounded part of any insulator or bushing, inside a fenced off substation yard, shall be a minimum 2.4m above ground level. The following table shall be used in all designs.

It may be necessary to have less clearance in certain existing yards, due to the existing layout and space restrictions. These cases shall be discussed with the Engineer before a final design is made.

Voltages Minimum Electrical Clearance in mm

Minimum Working Clearance in mm

System Nominal Voltage

System Highest Voltage

Phase-to-Earth (mm)

Phase-to-Phase (mm)

Vertical (mm)

Horizontal (mm)

132kV 145kV 1200 1650 3700 2300

2.29 Insulation Coordination

Standardised levels for the highest system voltages U m related to the rated voltages are defined in IEC60071-

1&2. According to these levels the test voltages for the insulation of high voltage equipment are defined.

Rated Voltage Un (kVrms)

132

Highest System Voltage Um (kVrms)

145

Power Frequency Withstand Voltage 50Hz, 1min. Upf (kVrms)

230

Lightning Impulse Withstand Voltage 1.2/50µs. Uli (kVrms)

550

2.30 Training

The Contractor shall, during construction, allow for “On site” training of skilled personnel to be appointed by

the Employer, in order to improve knowledge and transfer of skills. The Contractor shall also allow for a full course of formal training of at least six City Power employees in all aspects of the project material and equipment.

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Operational training, during commissioning and testing, shall involve the Employer’s operational and

supervisory staff. Training of protection, operational and technical personnel shall also be carried out during

factory acceptance testing, as described in this specification. The Employer will nominate the personnel who

will be required to attend the training during FATs, SATs and site commissioning.

2.30.1 Safety Training

• Prior to commencing work on site, the Contractor shall ensure that all staff on Site have completed

a training course during which they are instructed of the hazards on Site and the actions required of them. No staff shall be permitted to work on site unless they have completed the training.

• A safety meeting shall be held at least once a week, which all staff shall attend, to inform them of any existing or new hazard or health risk present on site.

• The proceedings of the safety meetings shall be recorded in writing and each staff member shall be copied with the minutes of the meeting. A declaration by each staff member that they understand the hazards and risks and the mitigating actions required of them shall be attached to these minutes. The minutes shall be kept on file on Site at all times.

• Every day, before commencing work, the Contractor shall hold a short discussion during which one staff member explains to the rest of the work team his/her understanding of the inherent hazards and risks. A different staff member shall be chosen each day so that all staff are required to demonstrate that they have a clear understanding of the hazards on site.

2.30.2 Installation, Operation and Maintenance Training

• Training shall be provided at City Power to enable the Employer's staff to install and maintain the equipment offered. Two hardware and maintenance training sessions with a maximum of ten personnel per session shall be provided.

• The Hardware and Maintenance Training course for the HV cable and ancillaries shall include, but not be limited to, the following:

- Theory of operation.
- Installation.
- Preventative maintenance.
- Testing, troubleshooting and configuration.
- Repairs.
- Maintenance manual review.
- Practical demonstration.

2.31 Labour

The Contractor shall make his own arrangements for the engagement of all labour and for their payment, housing, feeding and transport.

2.32 Signage and Labels

2.32.1 Fence Signage

The appropriate signage, as per City Power's requirements and international standards, shall be installed on the fence and the access gates.

The signs shall include danger notices, access warnings and limitations, operational prohibitions and first aid information.

All signs and notices shall be in English and the wording shall be submitted for approval, before manufacture commences.

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Danger and prohibition signage shall have red letters and written on a white background and information signage shall be white with black lettering.

The signage shall be manufactured from corrosive resistant materials and/or sheet metal, finished in a baked enamel coating. Holes shall be provided at each corner of the sign, for fixing purposes. The dimensions of the signs shall be as required by the wording thereon.

Stick-on lettering will not be accepted.

Letters for danger notices shall be minimum 50mm in height.

A standard safety and first aid notice and information shall be fixed to the access gate(s) and shall provide full safety and first aid instructions to be followed in case of an accident. The instructions shall be accompanied by illustrations to assist in the execution thereof.

2.32.2 Equipment Labels

Each piece of equipment, indoor and outdoor, shall be provided with an identification label, clearly indicating the actual designation of the equipment.

The signage shall be manufactured from UV and corrosive resistant materials and/or sheet metal, finished in a baked enamel coating. Holes shall be provided at each corner of the sign, for fixing purposes. The

dimensions of the signs shall be as required by the wording thereon. Stick-on lettering will not be accepted.

3. Design Information

3.1 Lutz Substation Electrical Equipment Layout

The general arrangement of the electrical equipment for Lutz substation is indicated in Fig 1. The two inner feeder bays will accommodate the overhead line feeders to Peter road and Christiaan de Wet road substations and the incomers on the outer sides will accommodate the two cable incomers from Dalkeith substation. The use of the cables simplifies the line turn-ins as there will be no power line crossings close to the substation.

Figure 1 : Lutz Substation general arrangement

3.2 Dalkeith Substation Electrical Equipment Layout

At Dalkeith substation Eskom allowed for two overhead line bays. This will now be converted to cable feeders. The existing bays have overhead gantries that will be converted to cable termination feeder bays as indicated on Fig 2.

Figure 2 : Dalkeith Substation general Tender No. Dalkeith – Lutz 132kV Cable

Pulling eyes shall be provided on both ends of a cable drum length. The pulling eye shall be securely connected to both the cable conductor and the sheath to avoid elongation of the sheath during installation.

The cable shall be installed using a winch and care shall be taken not to exceed the maximum permissible pulling force specified by the manufacturer.

Where conditions are particularly difficult, the continuous bond pulling method shall be used.

The bending radius during cable installation shall at all times be larger than the minimum specified by the manufacturer.

Cable rollers shall be used as far as possible to run out cables. Rollers shall be spaced so that the length of cable in the trench will be totally suspended during the laying operation and sufficiently close to prevent undue sagging and the cable from touching the ground. Rollers shall also be placed in the trench in such a manner that they will not readily capsize.

Cable rollers shall have no sharp projecting parts liable to damage the cables.

Where cables have to be drawn around corners, well-lubricated skid plates shall be used. The skid plates shall be securely fixed between rollers and shall constantly be examined during cable laying operations.

Where cables have to be drawn through sleeves or ducts special care shall be taken to avoid damage to the outer sheath. A suitable cable sock shall be used and particular care shall be exercised to avoid abrasion, elongation or distortion of any kind.

It will be assumed that the price or rates contained in the tender includes for the installation of cables in sleeves or below existing or newly installed services. The Engineer shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works if so required.

The Engineer shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works if so required.

Cables shall be neatly arranged in flat formation and the engineer or his representative shall inspect the installation before backfilling commences.

4.12.4 Cable Markers

No cable markers will be required. It will be expected of the appointed contractor to provide the GPS coordinates at each of the joints, terminations, bend points, service crossings, road crossings, optic fibre draw pits and link disconnection boxes and at 50m intervals.

4.12.5 Phase Rotation

The Contractor must ensure that the

correct phase rotation be maintained at both substations and must do their own testing for this purpose.

4.12.6 Drum Inspection and Mounting

Upon delivery, the cable drum should be visually inspected for damage, which may have occurred during transport. The manufacturer's seal on the inner and outer cable ends should be examined and the condition of armouring, serving and sheath inspected for mechanical damage. If the cable is found defective it shall not be installed and the cable shall be returned to the supplier for replacement.

During installation the cable should be carefully examined for any sign of damage as it leaves the drum. This is particularly important on the outer layers, where drum batten nails can cause damage.

If it is necessary to roll the cable drum, it should be rolled in the direction indicated by the arrow on the drum.

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The drum should be mounted on jacks, cable trailer or cable stands such that the cable is preferably pulled from the top and always in the direction opposite to that indicated by the arrow. When pulling from large drums, i.e. over 2m in diameter, the cable should be supported to prevent stressing the cable, from the drum to the trench on a suitable ramp.

To limit the chance of damage to the cable prior to removing the cable drum battens, a check should be done to ensure that the drum-spindle is level and permits even rotation of the drum.

During pulling there is a tendency for cable slack to accumulate on the drum, slack shall be avoided and one possible method to achieve this is to limit drum rotation by using plank brake shoes against one or both flanges of the drum.

4.12.7 Drum Position

Cable drums shall be positioned in line with the direction of cable pull.

4.12.8 Protection of Cables from Damage

Cables being drawn into place shall be kept clear of abrasive surfaces by suitable means, e.g. rollers, cable tiles, etc., to prevent any damage to the cable sheath. The cable must be placed in the trench without sustaining abrasion damage, and without allowing rocks etc., to fall into the trench.

On long cable runs where a cable changes direction, both horizontal and vertical, rollers shall be used to ensure a smooth pull and avoid damage to the cable. Cables, which are pulled into position by a winch, must use suitable cable stockings and swivels to prevent damage.

When laying cable by directional drilling, it is essential that the cable is not dragged over ground outside the drill hole or prepared trench, since abrasion is likely to damage the outer jacket and cause sheath faults.

4.12.9 Cable Pulling Tension

The tensions of the pull shall not exceed that specified by the manufacturers for the particular type and size of cable being pulled and shall be smoothly and continuously applied.

The maximum recommended pulling tensions when pulling a cable shall be specified by the contractor.

The trench or duct line should be set out so that any necessary deviations from a straight line occur over the largest possible radius. When pulling cable into duct lines incorporating bends lower maximum pulling tensions may be necessary to avoid the wire pulling rope cutting into the side of the duct.

Any winch used to pull cables shall have either a facility to automatically limit the pulling tension applied to a cable or a continuous reading dynamometer incorporated in the pulling arrangement to enable the actual pulling tension to be monitored.

Cable pulling pits are required at each significant change in cable route direction. The pits will be indicated, by

the contractor, on the design drawing.
4.12.10 Pulling Speed
To avoid damage due to overruns, the cable should be pulled just fast enough to keep the drum rotating smoothly.
4.12.11 Cable Bending Radii
The bending radius of the trench (and cables) will be limited to 20 x the cable diameter or according to the supplier's specification. No twists or kinks are permitted.
Page 43 of 63
Tender No. Dalkeith – Lutz 132kV Cable
4.13 Fibre Optic Cable
An optical fibre cable shall be installed with the power cable for protection and communication purposes between Dalkeith and Lutz substations.
All work shall be done according to the standards and technical requirements as stated in the General Specification. All equipment shall also meet the standards and technical requirements as stated in the General Specification.
4.13.1 Fibre Optic Scope of Works
The scope of work shall include but not be limited to:
• Supply all equipment as per Specification and Schedule of Quantities.
• Install 48-core non-metallic DUCT fibre cable inside 40mm HDPE pipe underground (next to the power cable) between Dalkeith and Lutz substations.
• Install 48-way patch panels in the new cabinets (to be supplied by others) at each substation
• Terminate the fibre at both substations on the new patch panels (coil spare cable inside the trench to allow 15m slack).
• Label the patch panel clearly to indicate the fibre source.
• Supply and install 4x 2m duplex patch leads.
• Supply and install 2x duplex, ruggedized, patch lead between the feeder protection panel (protection relay) and the fibre cabinet (length to be confirmed on site)
• Design and supply of a cable thermal monitoring system making use of a fibre optic cable installed in an optic sleeve on the phase conductors of the cable. (this may be an optional item).
o The system will be of the optical frequency-domain reflectometry or OFDR type.The system will monitor in real-time, to be able to predict e.g. the influence on a cable with a change in ambient temperature. All data will be fed into the SCADA system to enable pro-active responses during transient conditions.
o Thermal monitoring and protection will not share the same fibres.
• Test completed installation end to end as specified in the General Specification.
• Compile handover document including all test results as specified in CP_TSSPEC_109, PMLS and OTDR test results of complete installation and joint box positions.
4.13.2 Fibre Specification
The optical fibre cables to be installed and the installation of it shall comply with City Power's latest standards and NRS standards as listed.
Optical fibre cables shall be of the compact duct type, polyethylene sheathed, with a high degree of reinforcement to protect the fibres from micro bending due to the rigors of handling and the environmental conditions experienced by fibre optic cable.
The fibre optic cable shall be a 48-core, dual window (1300/1550nm), single mode, non-dispersion shifted, non-metallic, DUCT fibre cable. The diameter over the outer sheath of the cable shall be not less than 9mm. The thickness of the outer sheath shall be not less than 2mm.
Each optical fibre shall have a core diameter of 10 µm. Full particulars of the cable proposed need be submitted to the Engineer for approval.
Draw boxes with lockable lids shall be provided at all acute changes of direction, as well as at splicing positions.
Page 44 of 63
Tender No. Dalkeith – Lutz 132kV Cable
Supply and installation of twin fibre optic duct for future thermal monitoring as per drawing 112115-LUT-DW-

S1-E-52 and CP_TSSPEC_150 – to be installed as part of the HV cable feeders. **4.13.2.1 Applicable Specifications** **Document Type Description Reference Number Revision** **NRS Specification DUCT and Direct-buried Underground Fibre-optic Cable Part 1 NRS 088-1:2007 Edition 1** **NRS Specification DUCT and Direct-buried Underground Fibre-optic Cable Part 2 NRS 088-2:2009 Edition 1** **NRS Specification Joint use of Structures for Power and Telecommunication Lines NRS 043:2005 Edition 2** **NRS Specification Single-mode Non-dispersion Shifted Optical Fibres NRS 081:2005 Edition 1** **City Power Specification Specification for Long Span All-Dielectric Self-Supporting Fibre Optical Cable (ADSS) CP_TSSPEC_109 Rev 0** **City Power Specification Specification for 40mm Direct Burial Protective Sleeve for Fibre Optic Cable CP_TSSPEC_150 Rev 0** **4.13.2.2 Patch Panel Specification** **The fibre optic cable shall be secured on the outer sheath using a plastic compression gland where it enters the cabinet. The armouring of the cable shall be cut back 10 cm after the gland and shall be insulated using heat shrink or self-vulcanising tape. The armouring shall by no means be connected to the earth. At least 15m of slack should be left inside the trench for each cabinet.** **The slack fibre optic cable shall be routed neatly on the inside of the cabinet without exceeding the minimum bending radius as specified by the manufacturer. The cable should be routed in such a way that the optic distribution frame and slack cable can be easily removed from the cabinet and the fibre will not be damaged during normal operation including maintenance work.**			**The inner sheath of the fibre optic cable shall be secured at its entry to the ODF unit by means of a plastic compression gland and the central strength member shall be securely fastened.** **The fibres shall be neatly organised in the ODF with no twists or sharp bends. Plastic clips may be used to organise the bare fibres.** **All fibres shall be spliced to non-ruggedised pigtails which terminate on ST connectors on the ODF to be available on the front of the ODF.** **All ODFs must be clearly marked to indicate their source.** **4.13.2.3 Distributed Temperature Sensing, (DTS), System Components and Minimum Specification and Technical Requirements** **1. Fibre optic duct:** **a. Twin duct to be installed as part of the HV cable feeder.** **2. Fibre:** **a. Suitable 4 or 8 unit blown fibre to be used as per supplier required duct size for thermal monitoring; and** **b. Fibre strands to be encapsulated in a multi-layer performance acrylate coating system - to protect fibre during installation, to provide micro bend resistance within operating temperature range and to provide low friction for blowing.** **Page 45 of 63** **Tender No. Dalkeith – Lutz 132kV Cable** **3. Distributed Temperature Sensing (DTS) Equipment:** **a. Single end distributed temperature sensing (DTS) equipment (inclusive of sensing optoelectronics and an on-board PC) to measure the distributed temperature over the cable route in real-time.** **b. The following information is to be provided by the tenderer:** **i. Sampling resolution.** **ii. Spatial resolution.** **iii. Temperature resolution.** **iv. Minimum range.** **v. Number of input channels.** **4. Dynamic cable rating (DCR) system using a thermal model of the cable in accordance with IEC 60287 and IEC 60853-2 and providing the following outputs:**	

a. Conductor Temperature Calculation. **b. Real Time Dynamic Thermal Rating Calculations.** **c. Offline Prediction & Cable Rating (e.g. during cable maintenance where there can be increased load).** **d. Alerts in the event of hotspot/fire.** **e. Seamless system integration (e.g. SCADA, ventilation control, electrical relay).** **5. The DCR system cable thermal modelling algorithms needs to allow for the following:** **a. Differing cable constructions and sizes.** **b. Cable configuration (e.g. trefoil, flat formation).** **c. Sensing cable integrated into power cable.** **d. Sensing cable installed on outer surface.** **e. Cable environment (buried, tunnels & culverts).** **f. User friendly user-interface.** **6. Communication options:** **a. ON SITE: Laptop serial RS-232 or other interface; and** **b. OFF SITE: Wired-Ethernet connection for SCADA, via ADSL, GSM, GPRS, etc.** **7. Data storage:** **a. On-board data-storage for DTS equipment – with external SB drive;** **b. Real time, Daily, Weekly or Monthly downloads data sets (Real time view as per system interface requirements); and** **c. Temperature and Load triggers and alarms.** **8. DCRS format:** **a. Software package with input – output modelling and results.** **9. Frequency domain reflectometry (FDR) vs Time domain reflectometry (TDR):** **a. Both options allowed.** **10. Single end mode measurement vs double end mode measurement:** **a. Single end measurement preferred.** **11. Multi-mode measurement:** **a. Preferred to have up to 8 inputs.** **4.13.2.4 Terminations and Joints** **All joints shall be fusion type splices and shall meet the following testing criteria:** **• Maximum Splice Loss ≤ 0.1 dB** **• Mean Splice Loss ≤ 0.075 dB** **4.13.2.5 Testing**				**Testing shall be done according to:** **• NRS 088-2:2009 for DUCT** **Page 46 of 63** **Tender No. Dalkeith – Lutz 132kV Cable** **4.14 Protection Requirements** **Although protection does not form part of this tender it may be required from the Contractor to supply and install protection schemes in accordance with the latest Eskom scheme. There is a provisional cost allowed for in the price bill to cover the cost if this option is required.** **Primary protection of HV cable feeders shall be of current differential protection utilising fibre optic communication link between the Dalkeith and Lutz substation. Backup protection shall be directional overcurrent and earth fault. Thermal monitoring may be implemented on this project on both circuits.** **4.15 Cable Tests** **Factory and site acceptance tests must be performed as specified in accordance with SANS 60840 and witnessed by the engineer if required. The cable shall not be dispatched from the factory without the tests being completed. The following factory tests will apply:** **• Conductor examination (see 10.4 of SANS 60840);** **• Measurement of electrical resistance of conductor and of metallic screen (see 10.5 of SANS 60840);** **• Measurement of thickness of insulation and oversheath (see 10.6 of SANS 60840);** **• Measurement of thickness of metallic sheath (see 10.7 of SANS 60840);** **• Measurement of diameters, if required (see 10.8 of SANS 60840);** **• Hot set test for XLPE, EPR and HEPR insulations (see 10.9 of SANS 60840);** **• Measurement of capacitance (see 10.10 of SANS 60840);** **• Measurement of density of HDPE insulation (see 10.11 of SANS 60840);** **• Water penetration test, if applicable (see 12.4.18 of SANS 60840); and** **• Tests on components of cables with a longitudinally applied metal foil (see 12.4.19 of SANS 60840).**		

The insulation test shall be by means of an applied low frequency AC voltage (not DC). **Outer sheath tests shall routinely be performed immediately after the installation and backfilling of a length of** **cable, so that repairs, if required, can be done at that stage.** **Cables to be graphite coated to aid with sheath testing.** **Cables shall be pressure-tested and the exact leakage current shall be tabulated and certified.** **All test results shall be recorded and certified.** **4.16 As-built Drawings** **On completion of the Contract the Contractor will supply two hard copies and an electronic copy, in dwg and** **dxf format, of the as-built drawings.** **The hard copies shall be plotted on a suitable scale on A0 paper and where, required, overlap such in order to ease continuity between sheets. The electronic copy's scale shall be** **1:1 in the L031 WGS84 projection system.** **The following information shall be indicated on the geographical plans:** **• All relevant features such as fences, cadastral information, tracks, rivers, watercourses, pipelines, telecommunication circuits, power lines, railways, dwellings and any other obstructions.** **• Cable numbers and cable depths.** **Page 47 of 63** **Tender No. Dalkeith – Lutz 132kV Cable** **• Positions of all joints, terminations, sleeves or ducts.** **Page 48 of 63** **Tender No. Dalkeith – Lutz 132kV Cable** **5. Quality Plan** **The Contractor is to produce and submit a quality plan and construction program to the Employer, for approval,** **before site establishment.** **The quality plan must indicate the control points for quality to ensure that the works are done according to specification and should also cover the following:** **• Cable trenching.** **• Cable installation.**			**• Cable trench backfilling.** **• Cable joints, cable terminations.** **• Cable data requirements, etc.** **The Contractor is required to employ a competent supervisor or foreman on site for the duration of the project to implement workmanship quality checks.** **Inspections and quality checks on installations completed by the contractor will be conducted prior to hand-** **over of the project.** **In general the installation should be completed to the satisfaction of the requirements of this design document and that the workmanship during the construction phase should comply with the expected local industry standards.** **Any defects or non-compliant workmanship must be rectified by the contractor before the project can be handed over.** **Page 49 Tender No. Dalkeith – Lutz 132kV Cable** **Ground and surface water management** **□ No vehicles will be serviced on site.** **□ All chemical, oil, diesel or petrol spills must be contained immediately and reported to the City Power Environmental Coordinator.** **□ Storm water run-off must be managed in areas where it may negatively** **impact on the structures of power lines. Measures should be implemented to ensure that run-off water on the servitude does not run into dongas and cause an erosion hazard.** **Project Management** **Health and safety** **□ It is the responsibility of City Power to ensure that all construction and operational processes and procedures are compliant with the relevant health and safety regulations.** **All** **Dust Control □ Burning of waste material such as vegetation resulting from** **maintenance activities at the site is strictly prohibited.** **□ Drive at moderate speed on site access roads to minimise or avoid**		

dust pollution. In urban areas, access roads should be treated to reduce dust pollution (tar, concrete, chip stone, spraying with water etc.). **□ All site workers shall wear face masks when creating dust.**	**Project Management**			**upon completion of the contract.**	**Project Management**		
Noise Control □ City Power must comply with Health and Safety legislation that an overall noise rating level in areas where more than one noise source is placed is less than 85Db. **□ Avoid very noisy activities at times which would cause disturbance to neighbours.** **□ Keep to site hours** **□ All site workers shall use hearing protection when needed.**	**Project Manager**			**Flora (Common, rare and endangered plants)** **□ No endangered species (flora /fauna) must be removed or damaged. Where there is doubt, expert advice must be obtained.** **□ When a rare or endangered plant is to be removed, the Department of Water Affairs and Forestry must be contacted.** **□ No person is allowed to sell, offer, keep or convey any weed in the country.**	**Management objective** **- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line.** **- Prevention of litigation concerning removal of vegetation.**	**Measurable Target** **- No litigation concerning removal of vegetation.**	**All**
Community Issues **□ A list of neighbouring properties, property owner's names, addresses and telephone numbers and land use shall be drawn up.** **□ A plan of action shall be concluded with neighbouring property owners and the relevant authorities in the case of an emergency (veld fire, oil spillage or water contamination.** **□ Property owners and local residents shall be treated with respect at all times.** **□ Environmental clauses shall be included in contract documents for all contractors.** **□ All complaints shall be reported, recorded and investigated.**	**All**			**Management objective** **- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line.** **- Prevention of litigation concerning removal of vegetation.**	**Measurable Target** **- No litigation concerning removal of vegetation.**	**All**	
Bush Clearance **□ Tree and bush clearance will be strictly limited to the minimum specified in City Power construction specifications.**	**Management objective** **- Minimise vegetation interference to flow of electricity.** **- Minimise possibility of erosion due to removal of vegetation.**	**Measurable target** **- No vegetation interference with structures and statutory distances**		**Page 52 of 63** **Tender No. Dalkeith – Lutz 132kV Cable**			
Oil Management **♣ Insulating oil and related hydrocarbons pose a serious pollution problem when released into the environment. Not only do these compounds pose a fire hazard, but with one litre of oil having the potential to contaminate in excess of a million litres of water, it needs to be handled with care.** **♣ Oil can rapidly penetrate certain soil types, which may lead to extensive soil contamination as well as groundwater and surface water contamination. The Water Act 36 of 1998, states that hydrocarbons should not touch the soil or water and if they do, they shall be cleaned or removed immediately.** **♣ Appropriate containment facilities/spill kits shall be used to prevent spilled or leaked transformer oil from contaminating surface or groundwater.**							

♣ Bund walls shall be installed. Project Management Materials Storage ♣ Store chemicals such as fertilisers and herbicides in a labelled lock, which has an impervious floor. ♣ All chemicals shall have a Material Safety data Sheets (MSDS). Project Manager Contingency Plan ♣ Contingency plans for fire, oil and water contamination, etc, shall be planned in conjunction with neighbouring landowners, local villages and the municipality. Oil spillage response The following steps shall be adhered to should an oil spill occur. 1. Assess the risk ♣ Determine risks that may affect human health, the environment and property and create unsafe conditions. ♣ ALWAYS put SAFETY first. 2. Confine the spill ♣ Limit the area by blocking, diverting or confining the spill. ♣ Use absorbents such as socks and booms as found in spill kits. ♣ SPEED COUNTS, stop the flow of the oil before it enters storm water drains and contaminate water resources. 3. Stop the source ♣ After the spill is confined, stop the source of the spill e.g. Turn a container upright, plug a leak, transfer oil from damaged container to a new one or place the leaking equipment in a drip tray. ♣ Prevent unauthorised access to the spill site. 4. Assessment of the Spillage ♣ Assess the spill using the Model Oil Spill Assessment. 5. Evaluate the incident and implement clean up ♣ Reassess the incident and develop a plan of action e.g. place pillows and mat pads (found in spill kits) throughout the spill area to absorb the spill. 6. Report the spill ♣ To the Depot Manager/ Team Leader immediately after a spill occur.			**♣ The Environmental Officer (011) 490 7238 shall also be notified of the incident. ♣ City Power oil spill clean-up contractors: Rapid Spill Response Margen Service Enviroserve SRT Wastemen NOTE: Oil spill kits and oil absorbent materials can be obtained from the above mentioned oil clean up contractors. Project Management Page 53 of 63 Tender No. Dalkeith – Lutz 132kV Cable 7. Pollution clean up ♣ The appointed oil clean up contractor shall clean the spillage to acceptable levels. 8. Disposal of material ♣ All material accumulated during the spill shall be treated as hazardous and must be disposed properly in permitted waste disposal sites by the appointed oil clean up contractor. 9. Complete required documents ♣ Complete oil spill Register and send to Environmental Coordinator. 10. Environmental requirements ♣ Every site shall have an oil spill kit to contain oil. ♣ Areas where there are oil leakages, drip trays and oil absorbing material shall be used to prevent the spreading of possible oil pollution. Monitoring To ensure the undertaking and conformance to the EMP, a monitoring program shall be instituted. The monitoring program can be used to identify environmental issues and impacts that have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required. The program can also be used to identify findings that can be used to improve other EMPs. Monitoring must form part of the contract or work instruction. City Power (Project Manager) and the contractor must establish the period and**	

frequency. **It is recommended that:** **1. This EMP is viewed as a living document that should change to suit the needs of the project. All amendments are to be done in consultation with the relevant role players.** **2. The EMP must be presented and explained to the Construction team and/or contractors to sensitise them to pertinent environmental agreements and conditions.** **3. That site visits be conducted at intervals for the duration of the project** **by the Environmental Coordinator, representatives from planning execution, project management as well as affected parties as deemed necessary.** **4. A regular monitoring program to be in place to not only ensure conformance to the EMP but also to monitor environmental issues and impacts that have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required.** **5. A post-construction audit is conducted to identify non-conformance for** **which corrective action must be taken. Corrective action must take place before the contract is completed or signed off.** **6. Safety signs and procedures must be adhered to during the installation as stipulated in the Occupational Health and Safety Act (Act 85 of 1993). Avoid unnecessary congestion and disruption of traffic and pedestrians during installation. Warning signs and contact details should be displayed during construction.** **7. Re-instate the surface area and effected areas after trenching and installation as to the existing layout i.e. to its original condition. This includes tar roads and driveways, paving, curbs, grass, drainage systems and other servitudes. Level and clear site to satisfaction of landowner and municipal by-laws.**				**Final site inspection must be conducted to ensure that site has been re-** **instated. Considering the condition of the land in the study area, upon which the development is to take place, the impact of this development seems to outweigh any negative impacts that might occur if mitigation** **measures are implemented effectively.**			
Final Site Inspection/ Post construction				**All**			
Page 54 of 63				**Tender No. Dalkeith – Lutz 132kV Cable**			
5. ENVIRONMENTAL COMPLIANCE **For all projects whereby a Record of Decision (RoD) has been granted, the contractor shall strictly adhere to the following:** **♣ City Power Generic Environmental Management Plan (EMP),** **♣ The specific conditions of RoD issued by Gauteng Department of Agriculture and Rural Development (GDARD) and** **♣ EMP approved by GDARD.**				**Table 1: MODEL OIL SPILL ASSESSMENT TABLE** **Using your judgement and the facts available, allocate the relevant points (1, 3 or 5) to each of the following and add** **them together. The cumulative score will dictate the appropriate corrective action.**			
Condition 1 3 5				**Source of the spill Weep Drip/Leak Explosion/Incident**			
Age of spill Historic Happened recently - **spill still moist Happened within last 24h**				**Threat to any water** **body No threat Threat with rain**			
Access to waterway				**Containment**			
Leak is minor − can be controlled, contained and plugged with oil spill kit				**Leak is moderate −** **cannot be successfully managed with spill kit.**			
Leak is serious, containment is impossible				**Life threatening**			
Conditions Not at all							

Moderate
(Environmental or health risk only)
Serious
(Explosion, fire, health and major environmental)
Weather conditions Good weather and will last until spill is cleared
Moderate, but may change suddenly to weather conditions which will hamper containment
Raining
Properties affected None
On-site (Only City Power's property is affected)
Off-site (City Power's neighbouring properties and public roads)
≥25 points
Public relations threat Small Medium Large
Soil types Clay or compacted ground Loose or loam soil Sandy soil and Gravel
Traffic implications Not on any road Public road Road closed
PCB presence* None Less than 20 ppm in the oil
Over 20 ppm in the oil will automatically get ≥25 points
Total score Sub total Sub total Sub total
Signature_____Name_____ _Date_____Site_____

Minor spill
≤ 12 points
Moderate spill
13 – 24 points
Major spill
≥ 25 points
Clean-up must be performed and a report issued to the Environmental co-ordinator.
Contain and call in the assistance of the Environmental co-ordinator.
Contain, call on Environmental co-ordinator who will assess the situation and if needed call upon an emergency response team.
***If the PCB levels of the oil are not known through prior testing, the spill shall be treated as a PCB spill, until such time that analysis proves otherwise.**

6. NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this procedure. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this procedure are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

♣ City Power Safety, Health, Environmental and Quality Policy.
♣ City Power Environmental Management System Directive.
♣ Environmental Impact Assessment regulations in terms of chapter 5 of the National Environmental Management Act, 1998

ANNEXURE A: ENVIRONMENTAL LEGISLATION

1. ATMOSPHERIC POLLUTION PREVENTION ACT, NO. 45 OF 1965
2. CONSERVATION OF AGRICULTURAL RESOURCES ACT, NO. 43 OF 1983
3. ENVIRONMENT CONSERVATION ACTS, NO. 73 OF 1989
4. FENCING ACT, NO. 31 OF 1963
5. NATIONAL FOREST ACT, NO. 84 OF 1998
6. HAZARDOUS SUBSTANCES ACT, NO. 15 OF 1973
7. LAND SURVEY ACT, NO. 8 OF 1997
8. NATIONAL ENVIRONMENTAL MANAGEMENT ACT, NO. 107 1998
9. NATIONAL HERITAGE RESOURCES ACT, NO. 27 OF 1999
10. NATIONAL PARKS ACT, NO. 57 OF 1976
11. NATIONAL WATER ACT, NO. 36 OF 1998

Annexure 2 - Cable Drawings and Diagrams

LUTZ CABLE PROJECT DRAWING REGISTER

Drawing Title Drawing Number Rev
General Arrangement Dalkeith Substation 112115-LUT-DW-S1-E-07.2 0
Sections Dalkeith Substation 112115-

LUT-DW-S1-E-08.2 0
Trench Details 112115-LUT-DW-S1-E-52 0
Typical HV XLPE Single Core Joint Bay Layout 112115-LUT-DW-S1-E-53 0
HV XLPE Single Core Joint Bay Earthing Detail 112115-LUT-DW-S1-E-54 0
Manhole Detail HV Cable - Link Disconnection Box 112115-LUT-DW-S1-E-55 0
Manhole Detail HV Cable - Optic Fibre Draw Pit 112115-LUT-DW-S1-E-56 0
Lutz / Dalkeith Cable Route Plan 112115-LUT-DW-S1-E-60 0
88kV Cable Electrical Circuit Diagram 112115-LUT-DW-S1-E-61 0
Roads, Stormwater Layout and Longsections 112115-DALK-CIV-R-100 0
Road and Stormwater Details 112115-DALK-CIV-R-300 0
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Tender No. Dalkeith – Lutz 132kV Cable
Annexure 3 - Proposed Cable Length Requirements (To be finalised before manufacture)
Cable length Dalkeith - Lutz
From To Distance between Joint Bays Joint Bay Length Slack Snaking Terms Slack Total Cable required
Dalk sub JB1 360 10 4 8 2292
JB1 JB2 360 10 4 2244
JB2 JB3 360 10 4 2244
JB3 JB4 400 10 4 2484
JB4 JB5 400 10 4 2484
JB5 JB6 400 10 4 2484
JB6 JB7 400 10 4 2484
JB7 JB8 400 10 4 2484
JB8 JB9 400 10 4 2484
JB9 JB10 400 10 4 2484
JB10 JB11 400 10 4 2484
JB11 Lutz Sub 400 10 4 8 2532 4680 29184
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Tender No. Dalkeith – Lutz 132kV Cable

Annexure 4 – Applicable Standards and Specifications
General
Some of the Specifications are Generic and all irrelevant sections must be ignored.
The Tenderer shall complete all the technical schedules included in the various specifications included in this Annexure.
Failure to provide the required information will render the Tender Non-Responsive and will lead to disqualification.
No. Rev. Title and Publisher Attached Y/N
CP_TSSPEC_029 1 Specification for Adjustable Cable Clamps Y
CP_TSSPEC_078 1 Specification for notices, danger and warning signs Y
CP_TSSPEC_117 2 Specification for station class, Metal-Oxide Surge Arrestors Y
CP_TSSPEC_150 0 Specification for 40mm direct burial protective sleeve for fibre optic cables Y
CP_TSSPEC_109 0 ADSS with optical fibre Y
CP_TSGUID_005 0 Guidelines for fibre optic installations Y
CP_TSSPEC_153 1 Specification for 132 kV cables Y
CP_TSSPEC_009 0 Specification for alternating current disconnectors and earthing switches up to 145 kV Y
CP_TSSPEC_202 0 Specification for copper cladded steel conductor Y
NRS 077:2013 ED 2 XLPE-INSULATED CABLES AND ACCESSORIES FOR SYSTEMS WITH NOMINAL VOLTAGES OF 44kV, 66kV, 88kV AND 132 kV N
SANS 10198-13 1988 The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 13: Testing, commissioning and fault location N
SANS 1186 - Symbolic safety signs. N
SANS 1200AA - Standardized specifications for civil engineering construction – AA General (small works). N
SANS 1200C - Standardized specifications for civil engineering

construction – C Site Clearance. N **SANS 1200DA - Standardized specifications for civil engineering construction – Earthworks (small works). N** **SANS 1200LB - Standardized specifications for civil engineering construction – LB Bedding (pipes). N** **SANS 1200DB - Standardized specifications for civil engineering construction – DB Earthworks (pipe trenches). N** **SANS 1200G - Standardized specifications for civil engineering construction – G Concrete (structural). N** **SANS 1200GA - Standardized specifications for civil engineering construction – GA Concrete (small works). N** **SANS 1200H - Standardized specifications for civil engineering construction – H Structural steelwork. N** **SANS 1200HA - Standardized specifications for civil engineering construction – HA Structural steelwork (sundry items). N** **SANS 1200HC - Standardized specifications for civil engineering construction – HC Corrosion protection of structural steelwork.** **N** **SANS 1200M - Standardized specifications for civil engineering construction – M Roads (general). N** **SANS 1200MF - Standardized specifications for civil engineering construction – MF Base. N** **SANS 1200MM. - Standardized specifications for civil engineering construction – MM able and**			**to be verified as stipulated in specification**
Accessories Review Process			
Equipment Project Phase Activity			
Approval/Inspection/Tests Required			
Hold Points			
Visual Dimensional Engineering Design			**Verified Hold**
Test and / or Inspection			**Design Phase Review and approval of detailed designs**
HV Cable (incl. accessories) Type Test Certificates			**Perform Perform Hold**
All related type test certificates for Primary equipment			**Factory Testing Witnessing of routine tests at equipment factory**
			Verify Verify Witness Hold
			Equipment delivery to site and inspection
			Inspection of equipment delivery to site without damage (payment milestone for equipment)
			Verify Verify Installation Verify equipment installed to appropriate standards and in line with specification
			Verify Verify Site testing commissioning
			Witnessing of commissioning testing on site
			Witness Hold
			Final Inspection and handover
			Inspection of quality of installation works
			Witness
			Energising Witnessing on energising and on load measurements
			Witness
			End of DLP inspection
			Final inspection at the end of defects liability/notification period, retention released following this inspection
			Verify Verify
			Page 63 of 63
			REFERENCE REV CP_TSSPEC_009 0 SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND

EARTHING SWITCHES UP TO 145 kV
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Item Sub-clause Description Schedule A Schedule B
14 Gland plate
a) Minimum size mm 130 x 35
b) Material and thickness mm 5mm Aluminium
15 Protection of housings and mechanism boxes
a) IP rating IP55
b) Material type 304 Stainless steel
Metal finish
a) Finish offered on ferrous parts (to be approved) xxxxx
b) Finish offered on non-ferrous parts (to be approved) xxxxx
c) Method of rectifying damaged galvanising (to be approved) xxxxx
16 Insulators
Details of insulators offered
a) Manufacturer xxxxx
b) Type designation xxxxx
c) Number of units in stack xxxxx
d) Cantilever strength class Min kN 4
e) Torsoin strength N.m xxxxx
f) Compliance with profile requirements of SANS 60185
g) Insulator material Porcelain/ Composite
17 Insulator test voltages
Lightning impulse withstand voltage referred to sea level
a) To earth and between phases in the open position kV 150
b) Across the isolating distance kV 172
Characteristic wave shape of impulse (LIW = Lightning Impulse Withstand) µs 1,20/50
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____

REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 16 OF 37
Item Sub-clause Description Schedule A Schedule B
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for similar equipment? xxxxx
b) Period and value for short-time current test s 3
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing switch kg xxxxx
b) Complete disconnector with single earthing switch kg xxxxx
c) Complete disconnector with double earthing switch kg xxxxx
d) Separate earthing switch kg xxxxx
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____

REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 17 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this

specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_009
Proposed deviation
Tender Number:

_____

_____
Tenderer's Authorised Signatory:

_____

_____
Name in block letters Signature
Full name of company:

_____

_____

Annex C - Technical schedules A and B for 33 kV disconnector (hand-operated)
and 33 kV separate earthing switch
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item Sub-clause	Description	Schedule A	Schedule B
1	Service condition		
a)	altitude up to m	1800	
b)	ambient temperature Max o C	40	
	Min o C	-10	
c)	relative humidity Max %	90	
d)	level of pollution	Very Heavy	
e)	lightning area	Yes	
2	Disconnector		
a)	type of disconnector required	CRPDB	
b)	earthing facility required	Yes	
	single earthing switch	Yes	
	double earthing switches	Yes	
c)	arrangement of phases, in-line or transverse	Transverse	
3	Details of disconnector		
a)	manufacturer	xxxxx	
b)	type designation	xxxxx	
c)	number of breaks	2	
d)	isolating distance mm	xxxxx	
e)	main contacts	xxxxx	
1)	entry	Friction	
2)	type	xxxxx	
3)	contact force N	xxxxx	
4)	materials	xxxxx	
5)	wear allowance	xxxxx	
4	Details of earthing switch		
a)	manufacturer	xxxxx	
b)	type designation	xxxxx	
c)	number of breaks	1	
d)	isolating distance mm	xxxxx	
e)	main contacts	xxxxx	
1)	entry	xxxxx	
2)	type	xxxxx	
3)	contact force N	xxxxx	
4)	materials	xxxxx	
5)	wear allowance	xxxxx	
5	Disconnector rating		
a)	nominal system r.m.s voltage (U n) kV	33	
b)	nominal continous rated current A	1600	
c)	nominal short-time withstand current kA	25	
d)	short-time withstand current duration s	3	
e)	rated peak withstand current (dynamic) kA	50	
f)	60-second power frequency withstand r.m.s voltage Min kV	70	
g)	lightining impulse withstand peak voltage Min kV	200	
h)	phase spacing mm	1200	
i)	isolating distance mm	xxxxx	
6	Earthing switch ratings		
a)	nominal system r.m.s voltage (Un) kV	33	
b)	maximum system r.m.s. voltage (Um) kV	36	
c)	nominal short-time withstand current kA	25	
d)	short-time withstand current duration s	3	

e) rated peak withstand current (dynamic) kA 50
7 Mounting of disconnectors/earthing switches
a) is mounting structure for isolator to be provided by the supplier? Yes
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 20 OF 37
Item Sub-clause Description Schedule A Schedule B
b) is mounting structure for the separate earthing switch to be provided by the supplier? Yes
c) mounting of disconnector upright, horizontal or vertical? xxxxx
8 Method of operation, i.e. hand, electric motor or other Hand
9 For hand operation
a) horizontal or vertical movement offered? xxxxx
b) are interlocking facilities required? Yes
if yes, details Mechanical
c) requirements for earthing of vertical shaft
50 mm 2 , PVC-insulated, braided, tinned copper strap
10 Are spark gaps and arcing horn required? Yes
11 Auxiliary switches
a) Number of contacts for disconnectors
Type G 8
Type M 5
Type F 1
Type N 2
Type D
b) Number of contacts for earthing switches
Type M 4
Type N 4
c) Rotating of auxiliary switches
1) Continuous current A 10
2) Current overload for 1 s A 100
12 Each main terminal to be an aluminium flat pad of the following
a) No of holes/pitch mm 8 x 50
b) Diameter mm 14
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 21 OF 37
Item Sub-clause Description Schedule A Schedule B
13 Secondary terminals if other than spring-loaded
a) Type and make offered for approval xxxxx
14 Gland plate
a) Minimum size mm 130 x 35
b) Material and thickness mm 5mm Aluminium
15 Protection of housings and mechanism boxes
a) IP rating IP55
b) Material type 304 Stainless steel
Metal finish
a) Finish offered on ferrous parts (to be approved) xxxxx
b) Finish offered on non-ferrous parts (to be approved) xxxxx
c) Method of rectifying damaged galvanising (to be approved) xxxxx
16 Insulators
Details of insulators offered
a) Manufacturer xxxxx
b) Type designation xxxxx
c) Number of units in stack xxxxx
d) Cantilever strength class Min kN 4

e) Torsoin strength N.m xxxxx
f) Compliance with profile requirements of
SANS 60185 xxxxx
g) Insulator material Porcelain/ Composite
17 Insulator test voltages
Lightning impulse withstand voltage referred to
sea level
a) To earth and between phases in the open
position kV 200
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 22 OF 37
Item Sub-clause Description Schedule A Schedule B
b) Across the isolating distance kV 230
Characteristic wave shape of impulse (LIW = Lightning Impulse Withstand) µs 1,20/50
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for
similar equipment? xxxxx
b) Period and value for short-time current test s 3
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates
and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing
switch kg xxxxx
b) Complete disconnector with single earthing
switch kg xxxxx
c) Complete disconnector with double earthing
switch kg xxxxx
d) Separate earthing switch kg xxxxx
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 23 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_009
Proposed deviation
Tender Number:

_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 31 OF 37
Item Sub-clause Description Schedule A Schedule B
4 Details of earthing switch
a) manufacturer xxxxx
b) type designation xxxxx
c) number of breaks 1
d) isolating distance mm xxxxx
e) main contacts xxxxx
1) entry xxxxx
2) type xxxxx
3) contact force N xxxxx
4) materials xxxxx
5) wear allowance xxxxx

5 Disconnector rating
a) nominal system r.m.s voltage (U n) kV 132
b) nominal continous rated current A 1600
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 63
f) 60-second power frequency withstand r.m.s voltage Min kV 230
g) lightining impulse withstand peak voltage Min kV 550
h) phase spacing mm 3000
i) isolating distance mm xxxxx
6 Earthing switch ratings
a) nominal system r.m.s voltage (U n) kV 132
b) maximum system r.m.s. voltage (U m) kV 145
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 63
7 Mounting of disconnectors/earthing switches
a) is mounting structure for isolator to be provided by the supplier? Yes
Tender Number:
_____
Tenderer's Authorised Signatory:
_____
Name in block letters Signature
Full name of company:
_____

Item Sub-clause Description Schedule A Schedule B
b) is mounting structure for the separate earthing switch to be provided by the supplier? Yes
c) mounting of disconnector upright, horizontal or vertical? xxxxx

8 Method of operation, i.e. hand, electric motor or other Electric Motor
9 For electric motor operation
a) control voltage AC supply voltage V ac 230
DC supply voltage V dc 110
b) rated power W xxxxx
c) nominal continuous rated current A xxxxx
d) maximum current A xxxxx
e) motor operating times
Open to close s xxxxx
Close to open s xxxxx
f) alternative control switch labelling xxxxx
g) are interlocking arrangements required (interlocking only required when earthing switch is used) Yes
h) Local/Off/Remote switch required with N/O auxiliary contact status indication xxxxx
10 Are spark gaps and arcing horn required? Yes
11 Auxiliary switches
a) Number of contacts for disconnectors
Type G 8
Type M 5
Type F 1
Type N 2
Type D
b) Number of contacts for earthing switches
Type M 4
Type N 4
Tender Number:
_____
Tenderer's Authorised Signatory:
_____
Name in block letters Signature
Full name of company:
_____

Item Sub-clause Description Schedule A Schedule B
c) Rotating of auxiliary switches

1) Continuous current A 10
2) Current overload for 1 s A 100
12 Each main terminal to be an aluminium flat
pad of the following
a) No of holes/pitch mm 8 x 50
b) Diameter mm 14
13 Secondary terminals if other than spring-
loaded
a) Type and make offered for approval xxxxx
14 Gland plate
a) Minimum size mm 130 x 75
b) Material and thickness mm 5 mm aluminium
15 Protection of housings and mechanism
boxes
a) IP rating IP55
b) Material type 304 stainless
steel
Metal finish
a) Finish offered on ferrous parts (to be
approved) xxxxx
b) Finish offered on non-ferrous parts (to be
approved) xxxxx
c) Method of rectifying damaged galvanising (to
be approved)
16 Insulators
Details of insulators offered
a) Manufacturer xxxxx
b) Type designation xxxxx
c) Number of units in stack xxxxx
d) Cantilever strength class Min kN 4
e) Torsoin strength N.m xxxxx
f) Compliance with profile requirements of
SANS 60185 xxxxx
g) Insulator material Porcelain/ Composite
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____

Name in block letters Signature
Full name of company:
_____

_____

Item Sub-
clause Description Schedule A
Schedule B
17 Insulator test voltages
Lightning impulse withstand voltage referred to
sea level
a) To earth and between phases in the open
position kV 550
b) Across the isolating distance kV 630
Characteristic wave shape of impulse (LIW = Lightning Impulse Withstand) µs 1,20/50
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for
similar equipment? xxxxx
b) Period and value for short-time current test s 1
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates
and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing
switch kg xxxxx
b) Complete disconnector with single earthing
switch kg xxxxx
c) Complete disconnector with double earthing
switch kg xxxxx
d) Separate earthing switch kg xxxxx
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____

Name in block letters Signature
Full name of company:

_____

_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 36 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_009
Proposed deviation
Tender Number:

_____

_____
Tenderer's Authorised Signatory:

_____

_____
Name in block letters Signature
Full name of company:

_____

_____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV
PAGE 37 OF 37
Annex D – Stock Items
It is not intended that City Power should keep stock of these items.
REFERENCE REV
CP_TSSPEC_029 1
SPECIFICATION FOR ADJUSTABLE CABLE CLAMPS
PAGE 2 OF 17
ANNEX C – Item 3 - CLAMP CAB SIZE 50-7 REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE CLAMPS
PAGE 14 OF 17
Item 3 - CLAMP CAB SIZE 50-75 DOUBLE – SAP NO. 459
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub clause of CP_TSSPEC_029
Proposed deviation
Tender Number:

_____

_____
Tenderer's Authorised Signatory:

_____

_____
Name in block letters Signature
Full name of company:

_____

_____
REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE CLAMPS
PAGE 15 OF 17
ANNEX C – Item 4 - CLAMP CAB SIZE 75-100 DOUBLE – SAP NO. 460
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub clause of CP_TSSPEC_029
Description Schedule A Schedule B
1 Manufacturer xxxxx
2 2.1.1 Material of cable clamp Polypropylene
3 2.3 Does the design of the clamp comply with the drawing? Yes/No Yes
4 2.3 Do the threaded rod lengths comply? (220mm / 380mm) Yes/No Yes
5 3.2 Do the accessories comply? Yes/No Yes
6 4 Do the cable clamps comply with the marking, labelling and packing? Yes/No Yes
7 4.2.3 SAP numbers on the label Yes/No Yes
8 4.3.2 Installation instructions Yes/No Yes
Tender Number:

_____

_____
Tenderer's Authorised Signatory:

_____

_____
Name in block letters Signature

Full name of company:

_____

_____

REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 16 OF 17
Item 4 - CLAMP CAB SIZE 75-100 DOUBLE – SAP NO. 460
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub clause of CP_TSSPEC_029
Proposed deviation
Tender Number:

_____

_____

Tenderer's Authorised Signatory:

_____

_____

Name in block letters Signature
Full name of company:

_____

_____

REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 17 OF 17
Annex D – Stock Items
Material Group : NET-ACCS
Item SAP N o .
SAP Short Description SAP Long Description
1 457 CLAMP CAB SIZE 50-75 SINGLE
CLAMP, ADJUSTABLE, SINGLE, SIZE 50-75, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 50MM AND 75MM, COMPLETE WITH 220MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
2 458 CLAMP CAB SIZE 75-100 SINGLE
CLAMP, ADJUSTABLE, SINGLE, SIZE 75-100, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 75MM AND 100MM, COMPLETE WITH 220MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
3 459 CLAMP CAB SIZE 50-75 DOUBLE
CLAMP, ADJUSTABLE, DOUBLE, SIZE 50-75, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 50MM AND 75MM, COMPLETE WITH 380MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
4 460 CLAMP CAB SIZE 75-100 DOUBLE
CLAMP, ADJUSTABLE, DOUBLE, SIZE 75-100, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 75MM AND 100MM, COMPLETE WITH 380MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
REFERENCE REV
TITLE SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS
CP_TSSPEC_078 1
DATE: JANUARY 2011
PAGE: 1 OF 21

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SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS REFERENCE REV CP_TSSPEC_078 1 PAGE 2 OF 21
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SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS REFERENCE REV CP_TSSPEC_078 1 PAGE 3 OF 21
FOREWORD
Recommendations for corrections, additions or deletions should be addressed to the:
Technology Services Manager & BIRP
City Power Johannesburg (Pty) Ltd
P O Box 38766
Booysens
2016
SPECIFICATION FOR NOTICES,

DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 4 OF 21

INTRODUCTION

In order to comply with the Occupational Health and Safety Act, it is imperative to have the necessary notices, danger and warning signs installed on City Power's distribution networks.

1 SCOPE

This specification covers the design content of notices, warning and danger signs displayed on the City Power's distribution network.

2 NORMATIVE REFERENCES

The following documents contain provisions that through reference in the text constitute requirements of this specification. At the time of publication the editions indicated were valid. All standards and specifications are subject to revision. and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

Occupational Health and Safety Act 85 of 1993.

SANS 10140: Identification Colour Marking

SANS 1091: National Colour Standards

SANS 1186: Standard Signs and General Requirements

SANS 3668: Paints and Varnishes-Visual Comparison of the Colour Paints

SANS 7724: Paints and Varnishes

3 TYPES

Six types of notices, warning and danger signs are specified in this standard, for use on the Distribution network.

a) Sign 1 Low voltage enclosures.

b) Sign 2 Medium voltage chambers and enclosures

c) Sign 3 Procedure in case of fire.

d) Sign 4 Perform first aid and resuscitate a person suffering from the effects of electric shock.

e) Sign 5 Prohibit unauthorized persons from entering and interfering with electrical apparatus

f) Sign 6 Flooding by OC (pepper) gas

SPECIFICATION FOR NOTICES,
DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 6 OF 21

6.2 Packing

Only signs of the same type designation, material and size shall be packed together. The front of each sign shall be covered with a suitable material and the signs shall be so packed as to ensure that they are not damaged during normal handling, transportation and storage.

6.3 Documentation

6.3.1 Documentation shall be submitted in a technical catalogue format.

6.3.2 The technical catalogue shall specify the dimensions, reference numbers, and if applicable the complete range of other products and accessories available.

7 QUALITY MANAGEMENT

A quality management plan shall be set up in order to assure the proper quality management of the notice, danger and warning signs during design, development, production, installation and servicing phases. Guidance on the requirements for a quality management plan may be found in the SANS ISO 9001. The details shall be subject to agreement between City Power and the Supplier.

8 ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to assure the proper environmental management of the notice, danger and warning signs throughout their entire life cycles (i.e. during design, development, production, installation, operation and maintenance, decommissioning and disposal phases). Guidance on the requirements for an environmental management system may be found in SANS ISO 14001 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power's SHEQ Policy.

SPECIFICATION FOR NOTICES,

DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 7 OF 21
Annex A - Bibliography
None
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 8 OF 21
Annex B - Revision information
DATE REV. NO. NOTES
Aug. 2003 0 First issue
May 2010 1 Second issue
Changes on number 6 the material to be used
Changed specification to accommodate the new drawings
Added quality and environmental management
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 9 OF 21
Annex C - Item No. 1 – Sign 1 – SAP NO. 567
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of CP_TSSPEC_078
Description Schedule A Schedule B
1 Quantity of signs required
2 2 Do the signs comply with SANS 1186? Required
3 2 Do the colours comply with SANS 1091? Required
4 4 Do the signs comply with the drawings? Required
5 5 Does the material for the signs comply? Required
6 6 Is City Power’s SAP number on the packaging? Required
Tender Number:
_____
_____
Tenderer’s Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 10 OF 21
Deviation schedule - Item No. 1 – Sign 1 – SAP NO. 567
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition. evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Subclause of CP_TSSPEC_078
Proposed deviation
Tender Number:
_____
_____
Tenderer’s Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 11 OF 21
Annex C - Item No. 2 – Sign 2 – SAP NO. 568
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of CP_TSSPEC_078
Description Schedule A Schedule B
1 Quantity of signs required
2 2 Do the signs comply with SANS 1186? Required
3 2 Do the colours comply with SANS 1091? Required
4 4 Do the signs comply with the drawings? Required
5 5 Does the material for the signs comply? Required
6 6 Is City Power’s SAP number on the packaging? Required
Tender Number:
_____
_____
Tenderer’s Authorised Signatory:
_____
_____

Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 12 OF 21
Deviation schedule - Item No. 2 – Sign 2 – SAP NO. 568
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition. evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Subclause of CP_TSSPEC_078
Proposed deviation
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 13 OF 21
Annex C - Item No. 3 – Sign 3 – SAP NO. 6232
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of CP_TSSPEC_078
Description Schedule A Schedule B
1 Quantity of signs required
2 2 Do the signs comply with SANS 1186? Required
3 2 Do the colours comply with SANS 1091? Required
4 4 Do the signs comply with the drawings? Required
5 5 Does the material for the signs comply? Required
6 6 Is City Power's SAP number on the packaging? Required
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
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Annexure A – Bibliography
None
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METAL-OXIDE SURGE ARRESTORS
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PAGE 8 OF 24
Annexure B - Revision information
DATE REV. NO. NOTES
September 2004 0 First issue
September 2006 1 Inclusion of 132 kV station, metal-oxide surge arrestors without spark-gaps
Changed SABS documents to related SANS documents
(Nominal references)
Changed document font sizes and spacing to required sizes
Added Annex A and B
Additional information on quality assurance and environmental management
Renaming the document
October 2011 2 Logo's and title – Updated
Normative References – Included additional standards
Requirements – Edited and Updated
Test – Edited
Transportation, Storage and Installation – Included
Training – Edited
Quality Management – Included
Environmental Management – Included
Technical schedules – Inclusion of 11kV surge arrestors
Technical schedule – Edited 88kV and 132kV
Inclusion note in technical schedules
SPECIFICATION FOR STATION CLASS,
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Annexure C – Technical schedules A and B for 11kV Station Class Surge Arrestors
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item
Sub-clause
CP_TSS PEC_117
Description Schedule A Schedule B
1 Surge arrestor identification
a) OEM XXXX
b) Country XXXX
2 Site conditions
a) Altitude m 1800
b) Maximum, weighted average, ambient temperature °C 40
c) Minimum, weighted average, ambient temperature °C -10
d) Maximum diurnal variation °C 30
e) Intensity of solar radiation kW/m² 1,1
f) IEC pollution level Very Heavy
g) Live spray washing No
a) Expected life of arrestor at and MCOV yrs 25
3 Electrical conditions
a) Maximum system voltage (Um) kV 12
b) Nominal system voltage (Un) kV 11
c) Supply frequency Hz 50
d) BIL of equipment to be protected kV 95
e) System earthing Effective
Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.
Tender Number:
_____
_____
Tenderer’s Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR STATION CLASS, METAL-OXIDE SURGE ARRESTORS REFERENCE REV CP_TSSPEC_117 2
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Item

Sub-clause
CP_TSS PEC_117
Description Schedule A Schedule B
4 Electrical characteristics of arrestor
a) Arrestor classification Station class
b) Discharge class 2
c) Maximum nominal discharge current In kA 10
d) Residual voltage at discharge current at 10kA (8/20µs) kV 34
e) Maximum energy absorption capacity kJ/kVr 4.4
f) Arrestor rated voltage (Ur) kV 12
g) Maximum continuous operating voltage (MCOV) (Uc) kV 9.6
h) Creepage distance mm/kV 31
5 Insulation withstand
a) Lightning impulse (1,2/50 µs) withstand level (Housing insulation) kV ≥144
b) Power frequency withstand voltage 1.min (wet condition) kV ≥67
6 Arrestor characteristic data required
a) V-I characteristic curve at temperature ranging from 20 °C to 100 °C Yes
b) D.C voltage-current curves Yes
c) Temporary over voltage withstand capability curve in per unit of MCOV number with and without prior duty Yes
7 Arrestor temporary over voltage capability, with prior duty (prior duty as defined in annex D, IEC 60099-4)
a) Over voltage applied for 1 s kV XXXX
b) Over voltage applied for 5 s kV XXXX
c) Over voltage applied for 10 s kV XXXX
Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.
Tender Number:
_____
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Tenderer’s Authorised Signatory:
_____
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Name in block letters Signature

Full name of company:

_____

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SPECIFICATION FOR STATION CLASS, METAL-OXIDE SURGE ARRESTORS REFERENCE REV CP_TSSPEC_117 2 PAGE 11 OF 24

Item	Sub-clause CP_TSS PEC_117	Description	Schedule A	Schedule B
8		Physical dimensions of arrestors		
	a)	Overall height of arrestor mm	XXXX	
	b)	Minimum external flashover distance mm	XXXX	
	c)	External diameter of arrestor housing mm	XXXX	
9		Housing		
	a)	Housing material: Silicone Rubber		
	b)	Arrestor earth terminal	XXXX	
	b)	Colour of housing	Grey	
10		MOV elements		
	a)	Diameter of elements mm	XXXX	
	b)	Thickness of elements mm	XXXX	
	c)	Number of elements per arrestor	XXXX	
11		Arrestor mounting details		
	a)	Orientation	Vertical	
	b)	Method of mounting (≥3 mounting holes)	Base	
	c)	Diameter of mounting holes in base mm	XXXX	
	d)	PCD mm	XXXX	
	e)	Supplied with 3 bolts, 3 nuts, 3 tapered washers and 6 flat washers Yes/No	Yes	
12		Arrestor line terminal	XXXXX	
	a)	Type	Flat terminal /Stud	
	b)	Minimum length mm	XXXX	
	c)	Diameter or Dimension mm	XXXX	
	d)	Orientation	Vertical	
	e)	Material	Stainless steel	

Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.

Tender Number:

_____

_____

Tenderer’s Authorised Signatory:

_____

_____

Name in block letters Signature

Full name of company:

_____

_____

SPECIFICATION FOR STATION CLASS, METAL-OXIDE SURGE ARRESTORS REFERENCE REV CP_TSSPEC_117 2 PAGE 12 OF 24

Item	Sub-clause CP_TSSP EC_117	Description	Schedule A	Schedule B
13		Miscellaneous		
	a)	Sample for inspection	Required	
	b)	Total mass of assembled unit kg	XXXX	
	c)	Pressure relief capability provided	XXXX	
14		Loading		
	a)	Maximum permissible service load kN	XXXX	
	b)	Specified short-term load SSL N	XXXX	
	c)	Specified long-term load SLL N	XXXX	
	d)	Weight Kg	XXXX	
15		Ageing test under operating voltage simulating weather conditions. [according to IEC 61109]		
		Reference number of test report	XXXXX	
16		Partial discharge test		
	a)	Power frequency voltage applied [1,05 x MCOV] kV	25	
	b)	Maximum partial discharge pC	≤ 5	
18		Seal leakage test		
		Reference number of test report		
19		Drawings to be submitted		
	a)	Outline dimensions of arrestor, fit as for service required?	Yes	
	b)	Mounting details required	Yes	
	c)	Line and earth terminal, conductor clamping arrangement required?	Yes	
		ISO 9001 accreditation Yes/No	Yes	
		ISO 14001 accreditation Yes/No	Yes	

Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.

Tender Number:

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Tenderer’s Authorised Signatory:

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_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
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Technical schedule A and B for 11 kV Surge arrestors
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause
CP_TSSPEC_117 Proposed deviation
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company_____
_____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
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Annexure C – Technical schedules A and B for 88kV Station Class Surge Arrestors
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item
Sub-
clause
CP_TSS
PEC_117
Description Schedule A Schedule B
1 Surge arrestor identification
a) OEM XXXX
b) Country XXXX
2 Site conditions
a) Altitude m 1800
b) Maximum, weighted average, ambient
temperature °C 40
c) Minimum, weighted average, ambient
temperature °C -10
d) Maximum diurnal variation °C 30
e) Intensity of solar radiation kW/m² 1,1
f) IEC pollution level Very Heavy
g) Live spray washing No
h) Expected life of arrestor at and MCOV yrs 25
3 Electrical conditions
a) Maximum system voltage (Um) kV 100
b) Nominal system voltage (Un) kV 88
c) Supply frequency Hz 50
d) BIL of equipment to be protect
REFERENCE REVSPECIFICATION FOR PROTECTIVE SLEEVE FOR FIBRE OPTIC CABLES
CP_TSSPEC_150 O
PAGE 10 OF 14
ANNEX C – Item 1 –SLEEVE FIBRE OPTIC 40 MM – SAP NO. 1172
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of CP_TSSPEC_150
Description Schedule A Schedule B
1 Manufacturer XXXX
2 3.1(a) Material of flexible sleeve HDPE
3 3.1(b) Colour Yellow
4 3.1(c) Pilot string or draw-wire supplied Yes/ No Yes
5 3.1(e) Outside diameter 40 mm 40 mm
6 3.1(g) End caps on both ends Yes/No Yes
7 3.2(a) Constructed of high quality polymer Yes/ No Yes
8 3.2(d) Does the sleeve contain an ultra
slippery silicon bore Yes/ No Yes
9 3.6 Minimum bending radius of sleeve 10d 10d
10 4.1 Is the sleeve impact resistant? Yes/ No Yes
11 4.2 Pressure rating of the sleeve bar 10 bar
12 4.3 Is the sleeve UV protected? Yes/ No Yes
13 5 Are end caps supplied? Yes/ No Yes
14 6 Breaking strain of the pilot rope kg 100
15 7 Does the markings on the sleeve

comply? Yes/ No Yes
16 8 Does the packaging comply? Yes/ No Yes
17 8.2 Are the ends sealed? Yes/ No Yes
Tender Number:

_____
_____
Tenderer’s Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 11 OF 14
Item 1 –SLEEVE FIBRE OPTIC 40 MM – SAP NO. 1172
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Subclause of CP_TSSPEC_150
Proposed deviation
Tender Number:

_____
_____
Tenderer’s Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 12 OF 14
ANNEX C – Item 2 –COUPLING COMPRESSION FIBRE OPTIC 40 MM –
SAP NO. 1173
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of CP_TSSPEC_150
Description Schedule A Schedule B
1 Manufacturer XXXX
2 Material of compression coupling XXXX
3 3.5 IP rating of compression coupling
IP 66
4 3.5 Pressure rating bar 10
Tender Number:

_____
_____
Tenderer’s Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 13 OF 14
Item 2 –COUPLING COMPRESSION FIBRE OPTIC 40 MM – SAP NO. 1173
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Subclause of CP_TSSPEC_150
Proposed deviation
Tender Number:

_____
_____
Tenderer’s Authorised Signatory:

_____
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Name in block letters Signature
Full name of company:

_____
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REFERENCE REV
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SPECIFICATION FOR 40 MM DIRECT BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 14 OF 14
ANNEX D – Stock Items
Material Group : PIPE-DST
Item SAP No SAP Short Description SAP Long Description
1 1172 SLEEVE FIBRE OPTIC 40MM

YELLOW
SLEEVE. PROTECTIVE. FLEXIBLE, YELLOW. HIGH DENSITY POLYETHYLENE, FOR DRAWING FIBRE OPTIC CABLE. SUPPLIED AS COILS OF 300M IN LENGTH WITH AN OUTER DIAMETER OF
40MM. WITH PILOT STRING. FITTED WITH END CAPS. ITEM SPECIFICATION NO. CP_TSSPEC_150
2 1173 COUPLING FIBRE OPTIC 40MM
COUPLING. COMPRESSION. 40MM FOR YELLOW HIGH DENSITY POLYETHYLENE FIBRE OPTIC SLEEVE. ITEM SPECIFICATION NO. CP_TSSPEC_150
TITLE:SPECIFICATION FOR 132 kV CABLES – LUTZ PROJECT
REFERENCE REV
CP_TSSPEC_153 LUTZ1
DATE: DECEMBER 2015
PAGE: 1 OF 13
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SPECIFICATION FOR 88 kV CABLES
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FOREWORD
This specification was prepared by the following Work Group members:
M. Magemba Technology Services
G. Kingston Technology Services
Z. Ngqwala Technology Services
Patrick O’ Halloran Technology Services
The Work Group was appointed by the Distribution Study Committee, which, at the time of
approval, comprised the following members:
M. Magemba (Chairperson) Technology Services
A. Mazibuko Capital Execution
Van Staden Public Lighting
Ndlovu Lenasia Area
Makoni Midrand Area
Moraka Technology Services
G. Jardine Planning Services
Mayimele Siemens
Raseruthe Planning Services
P. O’ Halloran Technology Services
P. Netshisaulu Planning Services
S. Raseboka Technology Services
V. Rampersad Technology Services
G. Kingston Technology Services
Z. Ngqwala Technology Services
K. Colenso Reuven Area
F. Docrat Reuven Area
A. Spies Roodepoort Area

K. Hattingh Midrand Area
H. Williams Planning Services
J. McWilliam Hursthill Area
W. Harper Protection
M. Paravano Protection
M. Grobler Roodepoort Area
J. Kruger Reuven
G. Vrey SHEQ
F. Wouda Planning Services
Recommendations for corrections, additions or deletions should be addressed to the:
Technology Services Manager
City Power
Johannesburg (Pty) Ltd
P O Box 38766
Booysens
2016

INTRODUCTION
The effect of a high voltage cable failure is generally severe in terms of customer outage as well as repair cost to City Power. It is therefore important to ensure that HV cables comply with the required specifications and are of acceptable quality. As this is difficult to manage within the present City Power business structures it has been decided that SANS and IEC support structures will be relied upon to manage compliance to specification as well as quality. The implication to suppliers is that City Power will only purchase cables that bear the relevant SANS and/or IEC mark, or that have been fully tested in accordance with the requirements of this specification and NRS 077.
1 SCOPE
This specification covers City Power's requirements for high voltage cables in accordance with NRS 077.
2 NORMATIVE REFERENCES
The following documents contain provisions that, through reference in the text, constitute r e q u i r e m e n t s of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification a r e encouraged to investigate the possibility of applying the most recent editions of the documents l i s t e d below.
NRS 077, XLPE-insulated cables and accessories for systems with nominal voltages of 44 kV, 66 kV, 88 kV and 132 kV.
3 DEFINITIONS AND ABBREVIATIONS
The definitions and abbreviations in NRS 077 shall apply to this specification.
4 REQUIREMENTS
4.1 General
The high-voltage cables shall be 50/88 kV typically operating at a voltage of 88 kV.
SPECIFICATION FOR 88 kV CABLES
REFERENCE
CP_TSSPEC_153
REV
1
13PAG SPECIFICATION FOR 88 kV
CABLES REFERENCE
CP_TSSPEC_153
REV
1
13PAGE 13 OF
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost- effective than that specified by City Power.
Ite m N
Sub-clause of NRS 077
Proposed deviation
Tender Number:
Tenderer's Authorised Signatory:
Name in block letters Signature
Full name of company:
SPECIFICATION FOR 88 kV CABLES
REFERENCE
CP_TSSPEC_153
REV
1
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ANNEX D - STOCK ITEMS
Material Group: CABLE HV
Item SAP No. SAP Short Description SAP Long Description
1 1162 CAB 132 XLPE 1C 1000 AL

CSA CABLE 132 KV, 1000 MM SQ ALUMINIUM CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.
2 2172 CAB 132 XLPE 1C 800 CU CSA CABLE 132 KV, 800 MM SQ COPPER CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.
3 1802 CAB 132 XLPE 1C 400 CU CSA CABLE 132 KV, 400 MM SQ COPPER CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.
REFERENCE REV
TITLE SPECIFICATION FOR COPPER-CLAD STEEL CONDUCTOR
CP_TSSPEC_202 0
DATE: May 2014
PAGE: 1 OF 12
COMPILED BY FUNCTIONAL RESP.
APPROVED BY AUTHORIZED BY
.....
H NONKONYANA
TECHNICIAN:
TECHNOLOGY SERVICES
SUBSTATION
.....
M MAGEMBA
CHIEF ENGINEER (A):
TECHNOLOGY SERVICES
PRIMARY PLANT
.....
L. SETSHEDI
GENERAL MANAGER :
TECHNOLOGY SERVICES
.....
M. NZIMANDE
DIRECTOR:
ENGINEERING SERVICES
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4.4 Annealed Copper clad steel conductors 4
4.5 Connection types 7
5 TESTS 7
6 PACKAGING AND MARKING 7
7 DOCUMENTATION 8
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SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
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FOREWORD

This specification was prepared on behalf of the distribution study committee by the following work group
members:
H. Nonkonyana Technology Services
I. Gamede Technology Services
P. O'Halloran Condition Monitoring
The Work Group was appointed by the Transmission and Generation Study Committee, which, at the time
of approval, comprised of the following members:
I. Gamede Technology Services
V. Rampersad Technology Services
H. Nonkonyana Technology Services
H. Williams Planning Services
P. van Jaarsveld Planning Services
R Swanepoel Planning Services
G. Jardine Planning Services
M. Walter Power System Control
S.B. Khumalo Power System SCADA
F. Mphaphuli Power System Protection
N. Khumalo Power System Protection
W. Du Plessis Engineering Workshop
N. Soya Engineering Workshop
F. Ngubeni Risk Control
P. Radebe SHEQ
K. Colenso Network Optimisation
Recommendations for corrections, additions or deletions should be addressed to the:
Technology Services General Manager
City Power Johannesburg (Pty) Ltd
P O Box 38766
Booysens
2016
SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
REFERENCE REV
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INTRODUCTION

Copper is a preferred material for earthing systems due to favourable corrosion resistance and high conductivity as compared to alternative materials. Due to the relatively high scrap value and the accessibility of most earthing systems, there is a high risk of theft associated with these systems. It is clear that the risk of copper theft extends to all electrical installations in the City Power area of supply. Alternative materials are recommended in this guideline that meet the technical requirements, yet possess essentially no scrap value, and as such should dramatically curb theft.
Moreover, connections between the elements of the earthing system are recommended that will permit fusing temperature limits for the conductors and thus allow optimum conductor utilization. These connections also dramatically reduce maintenance requirements since the elements of the system are
fused there is no connection interface susceptible to corrosion and loss of contact pressure.

1 SCOPE

This specification recommends theft deterrent materials, including conductors and connections that may be utilised in all electrical installations for the purpose of earthing.

2 NORMATIVE REFERENCES

The following standards and specifications contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication the editions indicated were valid. All
standards and specification are subject to revision and parties to agreements based on this standard are
encouraged to investigate the possibility of applying the most recent editions of the standards and specification listed below.
IEEE 80 Guide for safety in AC substations grounding
NRS 102 Theft Deterrent Earthing Materials
ASTM B910 Specification for soft annealed copper clad steel wire
ASTM B193 Test Method for Resistivity of Electrical Conductor Materials
SANS 1063 Earth rods, couplers and connections
CP_TSSTAN_025 Standard for theft

deterrent materials
CP_TSSPEC_056 Specification for Earth rods and couplers
CP_TSSPEC_055 Specification for an exothermic welding system
3 DEFINITIONS AND ABBREVIATIONS
The definitions and abbreviations in the above documents shall apply to this specification.
IACS International Annealed Copper Standard
4 REQUIREMENTS
4.1 General
4.1.1 Nothing in this specification shall lessen the obligations of the supplier. The supplier shall be fully responsible for the design and manufacture of the theft deterrent materials and their satisfactory performance in service. This specification shall be in accordance with IEEE 80 and NRS 102.
4.2 General recommendations for earthing materials
4.2.1 The following basic criteria are the required properties for earthing materials for the purposes of this specification:
a)Corrosion resistance
b)High Electrical Ampacity
c)Mechanical robustness
SPECIFICATION FOR COPPER-CLAD STEEL CONDUCTOR
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d)Very limited scrap value
4.2.2 Most alternative materials exhibit clear deficiencies in one or more of the properties above rendering these materials unsuitable for long-term application in earthing systems, particularly where the materials are buried.
4.2.3 Steel conductors that have been electroplated with copper or "cladded" with copper foil have been proven locally and internationally and are considered to be the only long-term practicable solutions which meet all the necessary basic criteria.
4.3 The formula for currents and mechanical strength

$$\left(\frac{I}{A}\right)^2 t_c = \frac{\alpha_r \rho_r}{\left(\frac{\alpha_o \rho_o}{K_o + T_m - T_a}\right) \ln\left(\frac{K_o + T_m}{K_o + T_a}\right)} \times 10^4$$

Where
I is the rms current in kA
A mm 2 is the conductor cross section in mm 2
T m is the maximum allowable temperature in o C.
T a is the ambient temperature in o C (IEEE 80-2000, use 40 o C)
K o 1 / a r or 1 / a r at 0 o C
t c is the duration of current in s
a r is the thermal coefficient of resistivity at reference temperature rT in C o 1
a o is the thermal coefficient of resistivity at C o

0 in Co
1
r
r is the resistivity of the ground conductor at reference temperature rT in cm−Ω
m
TCAP is the thermal capacity per unit volume in J/cm 3 0
C
4.4 Annealed Copper clad steel conductors
4.4.1 Material: The wire shall consist of a core of homogenous open-hearth, electric-furnace, or
basic-oxygen steel with a continuous outer cladding of copper thoroughly bonded to the core
throughout. The copper clad steel shall be manufactured in accordance to ASTM B910. The
bonding process shall be metallurgical. Copper-clad steel conductors are available in 21%, 30%, 40% and 70% of the conductivity [based on the International Annealed Copper Standard (IACS)]
of copper. But for conductors used for earthing purposes the two required or appropriate
conductivity values are 30% and 40% respectively.
4.4.2 Tensile strength and elongation: The copper-clad steel wire shall conform to the tensile
strength requirements of Table1. The elongation shall be a minimum of 15% for all diameters.
4.4.3 Dimensions: The wire size range shall be from 0.643 mm to 5.827 mm diameter.
4.4.4 Adhesion and surface defects: The copper clad steel wire shall not reveal any seams,
pits, slivers, or other imperfection of sufficient magnitude to indicate inherent defects or
imperfections.
4.4.5Joints: The finished wire shall contain no joints or splices.
4.4.6Finish: The wire shall be free from copper discontinuities and all imperfections.
SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
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4.4.7Copper Thickness: The minimum copper thickness due to eccentricity shall not be less
than the values shown in Table 1.
4.4.8Resistivity: The electrical resistivity at a temperature of 20°C shall not exceed the values
prescribed in Table 1.
Nominal Conductivity [%IACS]
Normal Density [g/mm 3]
Maximum Resistivity at 20°C [Ωmm 2 /m]
Minimum Conductivity [%IACS]
30 8.15 0.0586 29.41
40 8024 (is this value correct?) 8.24 0.0440 39.21
Table 1: Density and Resistivity at 20°C
Nominal Conductivity [%IACS]
Minimum Tensile Strength [N/mm 2]
Minimum Copper Thickness [% of Diameter]
Nominal Copper Thickness [% of Diameter]
30 310 3.0 7
40 276 5.0 9
Table 2: Tensile and Minimum Copper Thickness
SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
REFERENCE REV
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Material Conductivity K for 3s fault Area (mm 2) Copper equivalent Maximum final temperature
150°C 1 250°C 2 400°C 3 450°C 4 800°C 5
Stranded annealed copper wire
100% 13.3 10.2 8.41 8.06 6.69 (16,35,70,95) 6

Copper – clad steel wire 40% 19.9 15.3 12.60 12.10 9.99 (16,35,70,95)6
Copper – clad steel wire 30% 23 17.70 14.50 13.90 11.50 (16,35,70,95)6
Zinc coated steel wire 8.5% 41.5 31.7 25.90 ** ** 16,35,70,95,120,150,185
****Temperature at which zinc coated (galvanised) steel is likely to be damaged.**
1 Maximum temperature for insulated conductors.
2 Copper may anneal at temperatures greater than 250°C.
3 Zinc coated (galvanised) steel melts at 418.5°C.
4 Maximum temperatures of brazen connections.
5 As steel fuses at 1300°C and copper fuses at 1083°C, if a conductor is exothermically welded at both ends, 800°C is considered a reasonable maximum temperature.
6 In order to meet the conductivity of copper a larger area of copper – clad – What is the equivalent for 70mm2 copper conduct
Table 3: Calculated K constants for a 3s fault time
SPECIFICATION FOR COPPER-CLAD STEEL CONDUCTOR
REFERENCE REV CP_TSSPEC_202 0
PAGE 7 OF 12
4.5 Connection types
The connections between elements in an earthing system are normally the limiting factor in the utilization of the earthing conductors. The following temperature limits are recommended for various common connection types:
Connection type Maximum allowable temperature o C
Bolted 250
Crimped 450 1
Brazed 450
Exothermic 1084 2
NOTE 1 Refer to manufacturer's recommended temperature limit for crimped connections as this varies with the type. The recommended value is to be used for high SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV CP_TSSPEC_108 3
PAGE 26 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 7: EQUIPOTENTIAL EARTHING FOOT PLATES SAP 3564
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:
_____
_____
Tenderer's Authorised Signatory:
_____
_____
Name in block letters Signature
Full name of company:
_____
_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV CP_TSSPEC_108 3
PAGE 27 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 8: INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG SAP 6165
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub-clause of CP_TSSPEC_108
Description Schedule A Schedule B
1 Name of manufacturer XXXX
2 Place of manufacture XXXX
3 Manufacturer's identification reference XXXX
4 4.1.4 Specification to which portable earthing gear complies

SANS 1934
& SANS
61230
5 4.1.9 System voltage suitability kV
6,6 to 12
6 4.1.8 Fault level withstand (1 second rating)
for complete breaking current
kA 14.4
7 4.1.5 Conductor material Stranded copper
8 4.7.3 Conductor C.S.A. mm2 95
11 4.5.5 Earth clamp material Leaded brass
12 4.7.2 Line clamp application Interswitch
B20
13 4.10.2 It shall be labelled with operating
instructions for closing
Yes
14 4.10.3 It shall have a 60 degree clockwise turn
locking position and push in to operate
Yes
15 N/A Line clamp range mm XXXX
16 6 Marking as per clause 6 Yes/No Yes
17 6 Packaging as per clause 6 Yes/No Yes
18 7 Is all the information requested in clause
7 supplied?
Yes/No Yes
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 28 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 8: INTERSWITCH
SWITCHGEAR INSERT SWITCH PLUG
SAP 6165
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 29 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET: HORIZONTAL/VERTICAL MOUNTING
SAP 349
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub-clause of CP_TSSPEC_108
Description Schedule A Schedule B
1 Name of manufacturer XXXX
2 Place of manufacture XXXX
3 Manufacturer's identification reference XXXX
4 Ideal for Inland areas Yes
5 Used for mounting Yes
6 Non-Ferrous Yes
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT

REFERENCE REV
CP_TSSPEC_108 3
PAGE 30 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET:
HORIZONTAL/VERTICAL MOUNTING
SAP 349
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number:

_____
_____
Tenderer's Authorised Signatory:

_____
_____
Name in block letters Signature
Full name of company:

_____
_____
SPECIFICATION FOR PORTABLE EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 31 OF 31
ANNEXURE D – STOCK ITEMS
Material Group: ELECTRICAL ACCESSORIES
Item SAP No. SAP Short Description SAP Long Description
1 3551 PANEL PORTABLE EARTH EQUIPMENT
PANEL PORTABLE EQUIPMENT FOR EARTHING OR EARTHING AND SHORT CIRCUITING FOR PANELS SUITABLE FOR NOMINAL VOLTAGES, 400V TO 33 KV. SPECIFICATION NO. CP_TSSPEC_108.
2 3561 OVERHEAD LINE PORTABLE EARTHING GEAR
OVERHEAD LINE PORTABLE EARTH GEAR FOR USE ON LV AND MV LINES, FOUR INTER-PHASE CONDUCTOR, WITH LENGTH OF 1.5 M EACH, AND SINGLE EARTHING CONDUCTOR OF 13 M LONG.
3 3562 HIGH VOLTAGE PORTABLE EARTHING GEAR
HIGH VOLTAGE EARTH EQUIPMENT, 6MM LONG, FOR USE ON SYSTEM VOLTAGES, 6.6 TO 132 KV FOR EARTHING AND SHORT CIRCUITING THREE PHASE DEVICES TO GROUND. SPECIFICATION CP_TSSPEC_108
4 6636 MAGNEFIX EARTHING KITS
PORTABLE MAGNEFIX EARTHING KITS, TO CONNECT ISOLATED APPARATUS DIRECTLY TO GROUND FOR SAFE DISCHARGE. CP_TSSPEC_108.
5 3565 INTERSWITCH EARTHING KITS
INTERSWITCH PORTABLE EARTHING KITS TO ISOLATE APPARATUS DIRECTLY TO GROUND TO ENSURE SAFE DISCHARGE OF ELECTRICAL ENERGY AT ALL TIMES.

| Eskom Research, Testing & Development102
The Flexible Grand Challenge Partnerships and collaboration
• EPRI – Electricity Power Research Institute (EPRI) has been a key partner to supplement the research programme with skills and common research challenges facing the industry.
• University of Stellenbosch – Expert academic research group on power system flexibility and customer behavioural economics.
• GIZ – German development agency funding research programmes on renewable energy integration and flexible operations.
• Danish Energy Agency – Danish research programme building capacity and skills on renewable energy integration into the power system and flexible operations.
• University of Witwatersrand – Has a smart grid research group under the leadership of Prof Willie Cronje. This group consists of both key academics in both power and IT/ OT sectors and will help lead research topics that are industry driven.

• Cape Peninsula University Technology – Has a real-time digital simulator as well as cluster computing capabilities to model ad simulate flexibility impacts on the grid, as well as generator dispatching criteria. The Research Framework FLEXIBLE OPERATIONS WORK PLAN Plant – all plant connected to grid Power Systems Market – Electricity supply industry • Determine range for ramping Gx fleet • Determine inertia, SCO and voltage control for ramping scenarios • Define current base for flexibility • Determine future of the Tx grid • How do we strategically position the wirel business with a focus on the technical issues? • Techno economic studies for minimum generation and beyond increasing ramping capabilities of stations • Investigate small modular cheap pump storage schemes • Investigation of PV response to system during thunderstorms and extreme events • Investigate the contribution of wind to inertia and fault ride through and determine the impact on the power system • Investigate the like hood of small PV inverters and functionalities on the power system • Investigate AGC at Sere wind farm • Investigate storage for the ancillary services to the grid • Map changes to system and related issues on grid • Includes South Africa and SADC • Investigates real time use of pricing and incentivising models • Investigate dynamic pricing models • Pilot and demo of energy storage on Dx and Tx lines and investigate costs		
defer- ment and power quality challenges • Investigate the locations of growth areas and growth rates of roof top PVs. Predict future market growth • Five to ten-year time frame • Identify what technologies are likely to be disruptive and anti		
5 2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK document, but an overview is given in the following subsections of this chapter. 2.1 The Common Technical Processes and the SE Engine There are three sets of common technical processes in NPR 7123.1, NASA Systems Engineering Processes and Requirements: system design, product realiza- tion, and technical management. The processes in each set and their interactions and flows are illustrated by the NPR systems engineering “engine” shown in FIGURE 2.1-1. The processes of the SE engine are used to develop and realize the end products. This chap- ter provides the application context of the 17 com- mon technical processes required in NPR7123.1. The system design processes, the product realization processes, and the technical management processes are discussed in more detail in Chapters 4.0, 5.0, and 6.0, respectively. Processes 1 through 9 indicated in FIGURE 2.1-1 represent the tasks in the execution of a project. Processes 10 through17 are crosscutting tools for carrying out the processes. PROJECT MANAGEMENT PROJECT MANAGEMENT ACTIVITIES • Setting up Project Team • Programmatic Stakeholders (non-technical, non-business) • Programmatic Planning (non-		

technical, non-business)
• Identifying Programmatic (non-technical) requirements
• Identifying Programmatic Risks
• Technology Transfer and Commercialization
• Integration of technical and non-technical activities
• Overall Approver/Decider
Systems Engineering
System Design Processes
• Stakeholder Expectations Definition
• Technical Requirement's Definition
• Logical Decomposition
• Design Solution Definition
Product Realization Processes
• Product Implementation
• Product Integration
• Product Verification
• Product Validation
• Product Transition
Technical Management Processes
• Technical Planning
• Requirements Management
• Interface Management
• Technical Risk Management
• Configuration Management
• Technical Data Management
• Technical Assessment
• Decision Analyses
PP&C
• PP&C Integration
• Resource Management
• Scheduling
• Cost Estimation & Assessment
• Acquisition & Contract Management
• Risk Management
• CM/DM
Common Areas
• Stakeholders
• Risks
• Configuration Management
• Data Management
• Reviews
• Schedule
FIGURE 2.0-1 SE in Context of Overall Project Management
6
2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK
Requirements Definition Processes
1. Stakeholders Expectations Definition
2. Technical Requirements Definition
3. Logical Decomposition
4. Design Solution Definition
System Design Processes
Requirements Flow Down from Level above
Technical Management Processes
10. Technical Planning
11. Requirement Management
12. Interface Management
13. Technical Risk Management
14. Configuration Management
15. Technical Data Management
16. Technical Assessment
Technical Decision Analysis Process
17. Decision Analysis
9. Product Transition
8. Product Validation
7. Product Verification
6. Product Integration
5. Product Implementation
Product Realization Processes
System Design Processes applied to each product layer down through system structure
Product Realization Processes applied to each product layer up through system structure
Requirements Flow Down To Level below
Realized Products to Level above
Realized Products From Level below
Cross - cutting
Cross-cutting
Technical Solution Definition Processes
Technical Planning Processes
Technical Control Processes
Product Transition Processes
Evaluation Processes
Design Realization ProcessesTechnical Assessment Processes
FIGURE 2.1-1 The Systems Engineering Engine (NPR 7123 1)
• System Design Processes: The four system

design processes shown in FIGURE 2.1-1 are used to define and baseline stakeholder expectations, generate and baseline technical requirements, decompose the requirements into logical and behavioral models, and convert the technical requirements into a design solution that will satisfy the baselined stakeholder expectations. These processes are applied to each product of the system structure from the top of the structure to the bottom until the lowest products in any system structure branch are defined to the point where they can be built, bought, or reused. All other products in the system structure are realized by implementation or integration.

• Product Realization Processes: The product realization processes are applied to each operational/ mission product in the system structure starting from the lowest level product and working up to higher level integrated products. These processes are used to create the design solution for each product (through buying, coding, building, or reusing) and to verify, validate, and transition up to the next hierarchical level those products that satisfy their design solutions and meet stakeholder

expectations as a function of the applicable life cycle phase.

• Technical Management Processes: The technical management processes are used to establish and evolve technical plans for the project, to manage communication across interfaces, to assess progress against the plans and requirements for the system products or services, to control technical execution of the project through to completion, and to aid in the decision-making process.

TABLE 2.1-1 Alignment of the 17 SE Processes to AS9100

SE Process	AS9100 Requirement
Stakeholder Expectations Definition	Customer Requirements
Technical Requirements Definition	Planning of Product Realization
Logical Decomposition	Design and Development Input
Design Solution Definition	Design and Development Output
Product Implementation	Control of Production
Product Integration	Control of Production
Product Verification	Verification
Product Validation	Validation
Product Transition	Control of Work Transfers; Post Delivery Support, Preservation of Product
Technical Planning	Planning of Product Realization; Review of Requirements; Measurement, Analysis and Improvement
Requirements Management	Design and Development Planning; Purchasing
Interface Management	Configuration Management
Technical Risk Management	Risk Management
Configuration Management	Configuration Management; Identification and Traceability; Control of Nonconforming Product
Technical Data Management	Control of Documents; Control of Records; Control of Design and Development Changes
Technical Assessment	Design and Development Review
Decision Analysis	Measurement, Analysis and Improvement; Analysis of Data

The processes within the SE engine are used both iteratively and recursively. As defined

in NPR 7123.1, “iterative” is the “application of a process to the same product or set of products to correct a discovered discrepancy or other variation from requirements,” whereas “recursive” is defined as adding value to the system “by the repeated application of processes to design next lower layer system products or to real- ize next upper layer end products within the system structure. This also applies to repeating application of the same processes to the system structure in the next life cycle phase to mature the system definition and satisfy phase success criteria.” The technical processes are applied recursively and iteratively to break down the initializing concepts of the system to a level of detail concrete enough that the technical team can implement a product from the information. Then the processes are applied recursively and iteratively to 8 2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK integrate the smallest product into greater and larger systems until the whole of the system or product has been assembled, verified, validated, and transitioned. For a detailed example of how the SE Engine could be used, refer to the NASA Expanded Guidance for SE document at https://nen.nasa.gov/web/se/ doc-repository. AS9100 is a widely adopted and standardized qual- ity management system developed for the commer- cial aerospace industry. Some NASA Centers have chosen to certify to the AS9100 quality system and may require their contractors to follow NPR 7123.1.			TABLE 2.1-1 shows how the 17 NASA SE processes align with AS9100. 2.2 An Overview of the SE Engine by Project Phase FIGURE 2.2-1 conceptually illustrates how the SE engine is used during each phase of a project (Pre- Phase A through Phase F). The life cycle phases are described in TABLE 2.2-1. FIGURE 2.2-1 is a conceptual diagram. For full details, refer to the poster version of this figure, which is located at https://nen.nasa.gov/ web/se/doc-repository. Pre-Phase A: Concept Studies ImplementationApproval Technical DevelopmentTechnical Management 5.2 Key Decision Points: Major Reviews: Feasible Concept Top-Level Architecture Functional Baseline Allocated Baseline As-Deployed Baseline 6.1 6.8 6.1 6.8 6.1 6.8 6.1 6.8 6.1 6.8 6.1 6.8 6.1 6.8 ? ? ? 5.3 5.4 5.5 5.1 4.2 4.1 4.3 4.4 ? ? ? ? ?		

?
?
4.2
4.1
4.3
4.4
5.1
5.3
5.4
5.5
5.2
Product Baseline
Phase F: Closeout
Phase E: Operations & Sustainment
Phase D: System Assembly, Integration & Test, Launch
Phase B: Preliminary Design & Technology Completion
Phase A: Concept & Technology Development
Phase C: Final Design & Fabrication
6.2
6.7
6.6
6.5
6.4
6.3
Formulation

FIGURE 2.2-1 Miniature Version of the Poster-Size NASA Project Life Cycle Process Flow for Flight and Ground Systems Accompanying this Handbook

The uppermost horizontal portion of this chart is used as a reference to project system maturity, as the project progresses from a feasible concept to an as-deployed system; phase activities; Key Decision Points (KDPs); and major project reviews. The next major horizontal band shows the technical development

processes (steps 1 through 9) in each project phase. The SE engine cycles five times from Pre-Phase A through Phase D. Note that NASA's management has structured Phases C and D to "split" the technical development processes in half in Phases C and D to ensure closer management control. The engine is bound by a dashed line in Phases C and D. Once a project enters into its operational state (Phase E) and closes out (Phase F), the technical work shifts to activities commensurate with these last two project phases. The next major horizontal band shows the eight technical management processes (steps 10 through 17) in each project phase. The SE engine cycles the technical management processes seven times from Pre-Phase A through Phase F.

TABLE 2.2-1 Project Life Cycle Phases

Phase	Purpose	Typical Outcomes
Pre-Formulation Pre-Phase A Concept Studies	To produce a broad spectrum of ideas and alternatives for missions from which new programs/projects can be selected. Determine feasibility of desired system, develop mission concepts, draft system-level requirements, assess performance, cost, and schedule feasibility; identify potential technology needs, and scope.	Feasible system concepts in the form of simulations, analysis, study reports, models, and mock-ups
Formulation Phase A Concept and Technology Development	To determine the feasibility and desirability of a suggested new system and establish an initial baseline compatibility with NASA's strategic plans. Develop	

final mission concept, system-level requirements, needed system technology developments, and program/project technical management plans.

System concept definition in the form of simulations, analysis, engineering models and mock-ups, and trade study definition

Phase B Preliminary Design and Technology Completion

To define the project in enough detail to establish an initial baseline capable of meeting mission needs. Develop system structure end product (and enabling product) requirements and generate a preliminary design for each system structure end product.

End products in the form of mock-ups, trade study results, specification and interface documents, and prototypes

Implementation

Phase C Final Design and Fabrication

To complete the detailed design of the system (and its associated subsystems, including its operations systems), fabricate hardware, and code software. Generate final designs for each system structure end product.

End product detailed designs, end product component fabrication, and software development

Phase D System Assembly, Integration and Test, Launch

To assemble and integrate the system (hardware, software, and humans), meanwhile developing confidence that it is able to meet the system requirements. Launch and prepare for operations. Perform system end product implementation, assembly, integration and test, and transition to use.

Operations-ready system end product with supporting related enabling products

Phase E Operations and Sustainment

To conduct the mission and meet the initially identified need and maintain support for that need. Implement the mission operations plan.

Desired system

Phase F Closeout

To implement the systems decommissioning/disposal plan developed in Phase E and perform analyses of the returned data and any returned samples.

Product closeout

10

2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK

2.3 Example of Using the SE Engine

In Pre-Phase A, the SE engine is used to develop the initial concepts; clearly define the unique roles of humans, hardware, and software in performing the missions objectives; establish the system functional and performance boundaries; develop/identify a pre-liminary/draft set of key high-level requirements, define one or more initial Concept of Operations (ConOps) scenarios; realize these concepts through iterative modeling, mock-ups, simulation, or other means; and verify and validate that these concepts and products would be able to meet the key high-level requirements and ConOps. The operational concept must include scenarios for all significant operational situations, including known off-nominal situations.

To develop a useful and complete set of scenarios, important malfunctions and degraded-mode opera-tional situations must be considered. The importance of early ConOps development cannot be

underesti- mated. As system requirements become more detailed and contain more complex technical information, it becomes harder for the stakeholders and users to understand what the requirements are conveying; i.e., it may become more difficult to visualize the end product. The ConOps can serve as a check in identi- fying missing or conflicting requirements. Note that this Pre-Phase A initial concepts develop- ment work is not the formal verification and valida- tion program that is performed on the final product, but rather it is a methodical run through ensuring that the concepts that are being developed in this Pre-Phase A are able to meet the likely requirements and expectations of the stakeholders. Concepts are developed to the lowest level necessary to ensure that they are feasible and to a level that reduces the risk low enough to satisfy the project. Academically, this process could proceed down to the circuit board level for every system; however, that would involve a great deal of time and money. There may be a higher level or tier of product than circuit board level that would enable designers to accurately determine the feasibil- ity of accomplishing the project, which is the purpose of Pre-Phase A. During Phase A, the recursive use of the SE engine is continued, this time taking the concepts and draft key requir			
mpetency Area Competency Description SE 1.0 System Design SE 1.1			**Stakeholder Expectation Definition & Management Eliciting and defining use cases, scenarios, concept of operations and stakeholder expectations. This includes identifying stakeholders, establishing support strategies, establishing a set of Measures of Effectiveness (MOEs), validating stakeholder expectation statements, and obtaining commitments from the customer and other stakeholders, as well as using the baselined stakeholder expectations for product validation during product realization SE 1.2 Technical Requirements Definition Transforming the baseline stakeholder expectations into unique, quantitative, and measurable technical requirements expressed as “shall” statements that can be used for defining the design solution. This includes analyzing the scope of the technical problems to be solved, defining constraints affecting the designs, defining the performance requirements, validating the resulting technical requirement statements, defining the Measures of Performance (MOPs) for each MOE, and defining appropriate Technical Performance Measures (TPMs) by which technical progress will be assessed. SE 1.3 Logical Decomposition Transforming the defined set of technical requirements into a set of logical decomposition models and their associated set of derived technical requirements for lower levels of the system, and for input to the design solution efforts. This includes decomposing and analyzing by function, time, behavior, data flow,**

object, and other models. It also includes allocating requirements to these decomposition models, resolving conflicts between derived requirements as revealed by the models, defining a system architecture for establishing the levels of allocation, and validating the derived technical requirements.	**product of the higher-level product. This includes preparing the product integration strategy, performing detailed planning, obtaining products to integrate, confirming that the products are ready for integration, preparing the integration environment, and preparing product support documentation.**
SE 1.4 Design Solution Definition	**SE 2.3 Product Verification**
Translating the decomposition models and derived requirements into one or more design solutions, and using the Decision Analysis process to analyze each alternative and for selecting a preferred alternative that will satisfy the technical requirements. A full technical data package is developed describing the selected solution. This includes generating a full design description for the selected solution; developing a set of 'make-to,' 'buy-to,' 'reuse-to,' specifications; and initiating the development or acquisition of system products and enabling products.	**Proving the end product conforms to its requirements. This includes preparing for the verification efforts, analyzing the outcomes of verification (including identifying anomalies and establishing recommended corrective actions), and preparing a product verification report providing the evidence of product conformance with the applicable requirements. (continued)**
SE 2.0 Product Realization	**15 2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK**
SE 2.1 Product Implementation	**Competency Area**
Generating a specific product through buying, making, or reusing so as to satisfy the design requirements. This includes preparing the implementation strategy; building or coding the produce; reviewing vendor technical information; inspecting delivered, built, or reused products; and preparing product support documentation for integration.	**Competency Description**
SE 2.2 Product Integration	**SE 2.0 Product Realization**
Assembling and integrating lower-level validated end products into the desired end	**SE 2.4 Product Validation**
	Confirming that a verified end product satisfies the stakeholder expectations for its intended use when placed in its intended 207NASA SYSTEMS ENGINEERING HANDBOOK
	Appendix G: Technology Assessment/Insertion
	A number of processes can be used to develop the appropriate level of understanding required for successful technology insertion. The intent of this appendix is to describe a systematic process that can be used as an example of how to apply standard systems engineering practices to

perform a comprehensive Technology Assessment (TA). The TA comprises two parts, a Technology Maturity Assessment (TMA) and an Advancement Degree of Difficulty Assessment (AD2). The process begins with the TMA which is used to determine technological maturity via NASA's Technology Readiness Level (TRL) scale. It then proceeds to develop an understanding of what is required to advance the level of maturity through the AD2. It is necessary to conduct TAs at various stages throughout a program/project to provide the Key Decision Point (KDP) products required for transition between phases. (See TABLE G.1-1.)

The initial TMA provides the baseline maturity of the system's required technologies at program/project outset and allows monitoring progress throughout development. The final TMA is performed just prior to the Preliminary Design Review (PDR). It forms the basis for the Technology Readiness Assessment Report (TRAR), which documents the maturity of the technological advancement required by the systems, subsystems, and components demonstrated through test and analysis. The initial AD2 provides the material necessary to develop preliminary cost and to schedule plans and preliminary risk assessments. In subsequent assessments, the information is used to build the Technology Development Plan and in the process, identify alternative paths, fallback positions, and performance descope options. The information is also vital to preparing milestones and metrics for subsequent Earned Value Management (EVM).

The TMA is performed against the hierarchical breakdown of the hardware and software products of the program/project PBS to achieve a systematic, overall understanding at the system, subsystem, and component levels. (See FIGURE G.1-1.)

TABLE G.1-1 Products Provided by the TA as a Function of Program/Project Phase

Gate Product	
KDP A: Transition from Pre-Phase A to Phase A	Requires an assessment of potential technology needs versus current and planned technology readiness levels, as well as potential opportunities to use commercial, academic, and other government agency sources of technology. Included as part of the draft integrated baseline.
KDP B: Transition from Phase A to Phase B	Technology Development Plan is baselined that identifies technologies to be developed, heritage systems to be modified, alternative paths to be pursued, fallback positions and corresponding performance descopes, milestones, metrics, and key decision points. Initial Technology Readiness Assessment (TRA) is available.
KDP C: Transition from Phase B to Phase C/D	Technology Development Plan and Technology Readiness Assessment (TRA) are updated. Incorporated in the preliminary project plan.
	Requires a TRAR demonstrating that all systems, subsystems, and components have achieved a level of technological maturity with demonstrated evidence of qualification in a relevant environment.

Source: NPR 7120 5

G.2 Inputs/Entry Criteria

It is extremely important that a TA process be defined at the beginning of the program/project and that it be performed at the earliest possible stage (concept development) and throughout the program/proj-

ect through PDR. Inputs to the process will vary in level of detail according to the phase of the program/ project, and even though there is a lack of detail in Pre-Phase A, the TA will drive out the major critical 208NASA SYSTEMS ENGINEERING HANDBOOK Appendix G: Technology Assessment/Insertion technological advancements required. Therefore, at the beginning of Pre-Phase A, the following should be provided:

• Refinement of TRL definitions.
• Definition of AD2.
• Definition of terms to be used in the assessment process.
• Establishment of meaningful evaluation criteria and metrics that will allow for clear identification of gaps and shortfalls in performance.
• Establishment of the TA team.
• Establishment of an independent TA review team.

.1: Integ MPS
.2: LH System
.3: O2 Fluid Sys.
.4: Pressure & Pneumatic Sys.
.5: Umbilicals & Disconnect
Crew Launch Vehicle
1.3
Launch Vehicle
1.3.8
First Stage
1.3.8.1
Upper Stage
1.3.8.2
Upper Stage Engine
1.3.8.3
...
MPS
1.3.8.2.4
...
US RCS
1.3.8.2.5
FS RCS
1.3.8.2.6
TVCS
1.3.8.2.7
Avionics
1.3.8.2.8
Software
1.3.8.2.9
...
Integrated Test H/W
1.3.8.2.10
...
.1: Integ RCS
.2: Integ Energy Support
.1: Integ RCS .1: Integ TVCS
.2: Actuator
.3: Hydraulic Power
.4: APU
. 1: Integ Avionics
.2: C&DH System
.3: GN&C H/W
.4: Radio Frequency System
.5: EPS
.6: Electrical Integration
.7: Develop Flight Instrument
.8: Sensor & Instrument System
.9: EGSE
.10: Integ CLV Avionics System Element Testing
.11: Flight Safety System
.1: Integ S/W System
.2: Flight S/W
. 1: MPTA
.2: GVT
.3: STA
.4: US for DTF-1
.5: US for VTF-2
.6: US for RRF-3
.7: Struc. Thermal Component Test

FIGURE G.1-1 PBS Example

G.3 How to Do Technology Assessment

The technology assessment process makes use of basic systems engineering principles and processes. As mentioned previously, it is structured to occur within the framework of the Product Breakdown Structure (PBS) to facilitate incorporation of the results. Using the PBS as a framework has a twofold benefit—it breaks the “problem” down into systems, subsys- tems, and components that can be more accurately

assessed; and it provides the results of the assessment in a format that can be readily used in the generation

of program costs and schedules. It can also be highly beneficial in providing milestones and metrics for progress tracking using EVM. As discussed above, it is a two-step process comprised of (1) the determination of the current technological maturity in terms of TRLs and (2) the determination of the difficulty associated with moving a technology from one TRL to the next through the use of the AD2.

Conceptual Level Activities

The overall process is iterative, starting at the conceptual level during program Formulation, establishing the initial identification of critical technologies, and establishing the preliminary cost, schedule, and risk mitigation plans. Continuing on into Phase A, the process is used to establish the baseline maturity, the Technology Development Plan, and the associated costs and schedule. The final TA consists only of the TMA and is used to develop the TRAR, which validates that all elements are at the requisite maturity level. (See FIGURE G.3-1.)

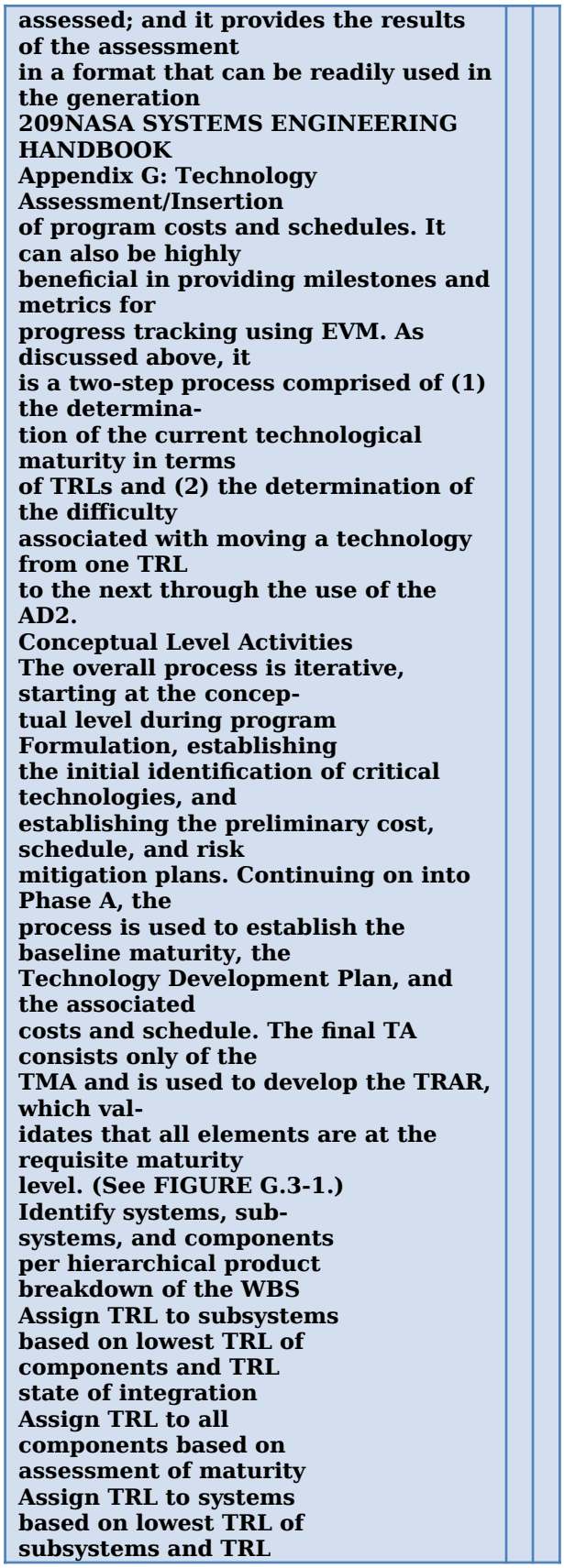
Identify systems, subsystems, and components per hierarchical product breakdown of the WBS
Assign TRL to subsystems based on lowest TRL of components and TRL state of integration
Assign TRL to all components based on assessment of maturity
Assign TRL to systems based on lowest TRL of subsystems and TRL state of integration
Identify all components, subsystems, and systems that are at lower TRLs than required by program
Baseline technology maturity assessment
Perform AD2 on all components, subsystems, and systems that are below requisite maturity level
Technology Development Plan
Cost Plan
Schedule Plan
Risk Assessment

FIGURE G.3-1 Technology Assessment Process

Even at the conceptual level, it is important to use the formalism of a PBS to avoid allowing important technologies to slip through the cracks. Because of the preliminary nature of the concept, the systems, subsystems, and components will be defined at a level that will not permit detailed assessments to be made. The process of performing the assessment, however, is the same as that used for subsequent, more detailed steps that occur later in the program/project where systems are defined in greater detail.

Architectural Studies

Once the concept has been formulated and the initial identification of critical technologies made, it is

necessary to perform detailed architecture studies with the Technology Assessment Process intimately interwoven. (See FIGURE G.3-2.)

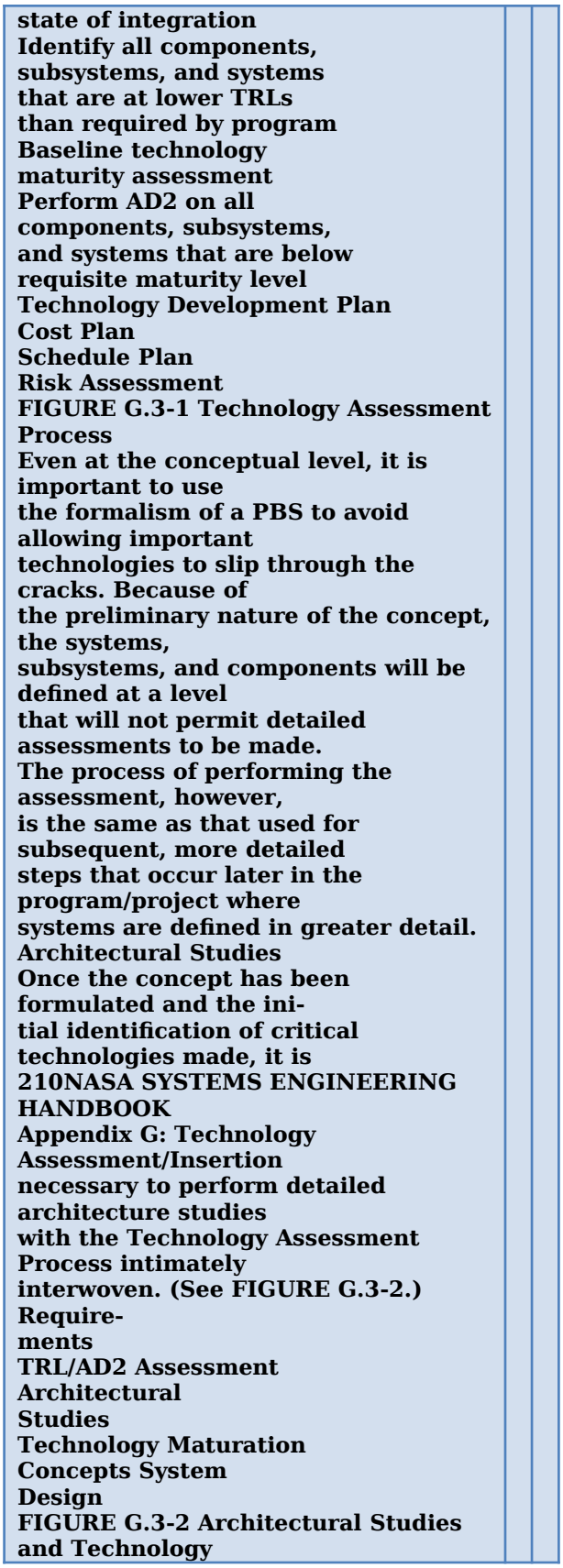

FIGURE G.3-2 Architectural Studies and Technology

Development
The purpose of the architecture studies is to refine end-item system design to meet the overall scientific requirements of the mission. It is imperative that there be a continuous relationship between architectural studies and maturing technology advances. The architectural studies should incorporate the results of the technology maturation, planning for alternative paths and identifying new areas required for development as the architecture is refined. Similarly, it is incumbent upon the technology maturation process to identify requirements that are not feasible and development routes that are not fruitful and to transmit that information to the architecture studies in a timely manner. It is also incumbent upon the architecture studies to provide feedback to the technology development process relative to changes in requirements. Particular attention should be given to "heritage" systems in that they are often used in architectures and environments different from those in which they were designed to operate.

G.4 Establishing TRLs

A Technology Readiness Level (TRL) is, at its most basic, a description of the performance history of a given system, subsystem, or component relative to a set of levels first described at NASA HQ in the 1980s. The TRL essentially describes the state of a given technology and provides a baseline from which maturity is gauged and advancement defined. (See FIGURE G.4-1.)

Programs are often undertaken without fully understanding either the maturity of key technologies or what is needed to develop them to the required level. It is impossible to understand the magnitude and scope of a development program without having a clear understanding of the baseline technological maturity of all elements of the system. Establishing the TRL is a vital first step on the way to a successful program. A frequent misconception is that in practice, it is too difficult to determine TRLs and that when you do, it is not meaningful. On the contrary, identifying TRLs can be a straightforward systems engineering process of determining what was demonstrated and under what conditions it was demonstrated.

Terminology

At first glance, the TRL descriptions in FIGURE G.4-1 appear to be straightforward. It is in the process of trying to assign levels that problems arise. A primary cause of difficulty is in terminology; e.g., everyone knows what a breadboard is, but not everyone has the same definition. Also, what is a "relevant environment?" What is relevant to one application may or may not be relevant to another. Many of these terms originated in various branches of engineering and had, at the time, very specific meanings to that particular field. They have since become commonly used throughout the engineering field and often acquire differences in meaning from discipline to discipline, some differences subtle, some not so subtle. "Breadboard," for example, comes from electrical engineering where the original use referred to checking out the functienvironment and ensuring that any

anomalies discovered during validation are appropriately resolved prior to product transition. This includes preparing to conduct product validation, performing the product validation, analyzing the results of validation (including identifying anomalies and establishing recommended corrective actions), and preparing a product validation report providing the evidence of product conformance with the stakeholder expectations baseline. **SE 2.5 Product Transition** **Transitioning the verified and validated product to the customer at the next level in the system structure. This includes preparing to conduct product transition, evaluating the product and enabling product readiness for product transition, preparing the product for transition (including handling, storing, and shipping preparation), preparing sites, and generating required documentation to accompany the product** **SE 3.0 Technical Management** **SE 3.1 Technical Planning** **Planning for the application and management of each common technical process, as well as identifying, defining, and planning the technical effort necessary to meet project objectives. This includes preparing or updating a planning strategy for each of the technical processes, and determining deliverable work products from technical efforts; identifying technical reporting requirements; identifying entry and success criteria for technical reviews; identifying product and process measures to be used; identifying**			**critical technical events; defining cross domain interoperability and collaboration needs; defining the data management approach; identifying the technical risks to be addressed in the planning effort; identifying tools and engineering methods to be employed; and defining the approach to acquire and maintain technical expertise needed. This also includes preparing the Systems Engineering Management Plan (SEMP) and other technical plans; obtaining stakeholder commitments to the technical plans; and issuing authorized technical work directives to implement the technical work** **SE 3.2 Requirements Management** **Managing the product requirements, including providing bidirectional traceability, and managing changes to establish requirement baselines over the life cycle of the system products. This includes preparing or updating a strategy for requirements management; selecting an appropriate requirements management tool; training technical team members in established requirement management procedures; conducting expectation and requirements traceability audits; managing expectation and requirement changes; and communicating expectation and requirement change information** **SE 3.3 Interface Management** **Establishing and using formal interface management to maintain internal and external interface definition and compliance among the end products and enabling products. This includes preparing interface management procedures, identifying interfaces, generating and**		

maintaining interface documentation, managing changes to interfaces, disseminating interface information, and conducting interface control	**configuration control, maintaining the status of configuration documentation, and conducting configuration audits**
SE 3.4 Technical Risk Management	**SE 3.6 Technical Data Management**
Examining on a continual basis the risks of technical deviations from the plans, and identifying potential technical problems before they occur. Planning, invoking, and performing risk-handling activities as needed across the life of the product or project to mitigate impacts on meeting technical objectives. This includes developing the strategy for technical risk management, identifying technical risks, and conducting technical risk assessment; preparing for technical risk mitigation, monitoring the status of each technical risk, and implementing technical risk mitigation and contingency action plans when applicable thresholds have been triggered.	**Identifying and controlling product-related data throughout its life cycle; acquiring, accessing, and distributing data needed to develop, manage, operate, support, and retire system products; managing and disposing data as records; analyzing data use; obtaining technical data feedback for managing the contracted technical efforts; assessing the collection of appropriate technical data and information; maintaining the integrity and security of the technical data, effectively managing authoritative data that defines, describes, analyzes, and characterizes a product life cycle; and ensuring consistent, repeatable use of effective Product Data and Life-cycle Management processes, best practices, interoperability approaches, methodologies, and traceability. This includes establishing technical data management strategies and policies; maintaining revision, status, and history of stored technical data and associated metadata; providing approved, published technical data; providing technical data to authorized parties; and collecting and storing required technical data.**
(continued)	
16	
2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK	
Competency Area	**Competency Description**
SE 3.0 Technical Management	
SE 3.5 Configuration Management	**Identifying the configuration of the product at various points in time, systematically controlling changes to the configuration of the product, maintaining the integrity and traceability of product configuration, and preserving the records of the product configuration throughout its life cycle. This includes establishing configuration management strategies and policies, identifying baselines to be under**
	SE 3.7 Technical Assessment
	Monitoring progress of the technical effort and providing status information for support of the system design, product realization, and technical management efforts. This includes developing technical assessment strategies and policies, assessing technical work productivity, assessing product quality, tracking

and trending technical metrics, and conducting technical, peer, and life cycle reviews. SE 3.8 Technical Decision Analysis Evaluating technical decision issues, identifying decision criteria, identifying alternatives, analyzing alternatives, and selecting alternatives. Performed throughout the system life cycle to formulate candidate decision alternatives, and evaluate their impacts on health and safety, technical, cost, and schedule performance. This includes establishing guidelines for determining which technical issues are subject to formal analysis processes; defining the criteria for evaluating alternative solutions; identifying alternative solutions to address decision issues; selecting evaluation methods; selecting recommended solutions; and reporting the results and findings with recommendations, impacts, and corrective actions 147 6.0 Crosscutting Technical ManagementNASA SYSTEMS ENGINEERING HANDBOOK performance characteristics and for initiating detailed design for a CI. The allocated baseline is usually controlled by the design organization until all design requirements have been verified. The allocated baseline is typically established at the successful completion of the PDR. Prior to CDR, NASA normally reviews design output for conformance to design requirements through incremental deliveries of engineering data. NASA control of the allocated baseline occurs through review of the engineering deliveries as data items.	**• Product Baseline: The product baseline is the approved technical documentation that describes Level 1 Technical Requirements FUNCTIONAL BASELINE Configuration Information Non-Configuration Information (examples) Milestones Major Architecture Aspects of Design Complete ALLOCATED BASELINE Implementation Aspects of Design Complete PRODUCT BASELINE Realization Aspects of Design Complete; Fabrication and Text Complete MDR Concept Partial analyses and studies Program and project plans Developmental data Complete analyses Developmental data Test plans System Spec Test information Manuals Certifications Product structure SDR SRR PDR ORR SAR CDR Segment Spec Prime Item Design-to-Spec End Item Design-to-Spec End Item Build-to-Spec End Item Design-to-Spec End Item**

Design-to-Spec
Segment Spec Segment Spec
Prime Item
Design-to-Spec
Prime Item
Design-to-Spec
FIGURE 6.5-3 Evolution of Technical Baseline
City power: vision mission municipality ;
The starting

Trade drawing but mission properly is municipality governance **Articles**

Title	**CEO Visits City Power Depots**
Tagline	**Your work environment is where you spent most of the time, only returning home to be with your loved ones at the end of the day. It is therefore critical that all employees keep their work environment clean, healthy and professional. Ntsokolo said.**
Summary	**Your work environment is where you spent most of the time, only returning home to be with your loved ones at the end of the day. It is therefore critical that all employees keep their work environment clean, healthy and professional. Ntsokolo said.**
ImageURL	

SchedulingStartDate	**5/3/2021 12:00 AM**
SchedulingEndDate	**7/31/2021 5:00 PM**
ArticleAuthor	**City Power News to Internal Employees**
ArticleType	**Featured News**

Content

A planned outage is a power interruption that occurs when City Power switches off electricity supply at a substation or other portion of the network in order to execute maintenance and /or emergency duties to correct defects in the network so that it functions at its maximum potential.

Loss of Power

A subsequent loss of power to customers as a result of a planned outage being implemented, may affect all or some of the areas/customers supplied from the substation or portion of the network concerned as in certain occasions only part of the substation may be isolated.

However it is important to note that the areas mentioned as affected in the scheduled planned outage notice document are the areas that will definitely be isolated (switched off).

For more information please see the scheduled planned outage notices attached

www.citypower.co.za
City Power Johannesburg
40 Heronmere Road
Reuven
Johannesburg
PO B Box 38766
Booysens
2016
Tel +27(0) 11 490 7000

Fax +27(0) 11 490 7590
Non-Executive Directors: L Bethlehem (Chairperson of the Board), H Chewane, D Gibson, D Hunt, N Kahlana-Mcubuse, M Mello, L Nage, M Seopela
Executive Directors: L Setshedi (Chief Executive Officer)
M Smith (Company Secretary)
Registration number: 2000/030051/30
VAT number: 4710191182
14 February 2019
Time: 15h30
Media Alert
Alexandra planned outages cancelled due to load shedding
The Planned outages that were scheduled to affect Alexandra tonight and tomorrow night (14 and 15 Feb 2019) have been cancelled due to load shedding.
The planned power interruption was necessary to do essential maintenance work on our network which is part of our program of constantly striving to provide better service.
It would be extremely harsh for City Power customers in Alexandra to experience load shedding and planned outage in the same evening which would subject them to long hours of electricity loss.
Stage 2 load shedding that affects block 1B including parts of Alexandra will start at 20h00 this evening and it is expected to return at 22h00.
City Power appeals to customers in Alexandra not to conflate the 20h00 load shedding and cancelled planned outage as the same power outage.
City Power will inform people of Alexandra well in advance of the new date for a planned outage.
As the supply may be restored at anytime, customers are urged to treat their electricity supply points as live at all times
For updated list of blocks and areas affected by load shedding please visit City Power website on www.citypower.co.za
City Power will keep customers updated via twitter handle: @CityPowerJhb
……Ends……
……
For media queries please contact

Isaac Mangena – City Power Spokesp
HomeCurrently selected
Customers

- **Feedback**
- **Geyser Control**
- **Meter Reading Schedules**
- **Tariff Info**
- **Prepaid Vending**
- **Energy Tips**
- **Fault Logging**
- **Claim Forms**
- **Load Shedding**
- **Energy Usage**
- **Service Connection Application Process**

Tenders

- **Available Tenders**
- **Supplier Registration**
- **Tender Notices**

City Power

- **Leadership**
- **Company Profile**
- **Media Statements**
- **City Power Reports**
- **Community Partnership Programme**

Contact Us

- **City Power Locations**
- **Maps to City Power**

Bid close tendered energy metering reading

Instrumentl control measure beater panel

Bid close

APPLICATION FORM FOR TRADE ASSISTANT
⎫ Kindly note that applications are only open to South African citizens;
⎫ The purpose of this form is to assist City Power in selecting suitable

candidates;
⎫ This form must be submitted in full, accurately and legibly. All substantial information relevant
to a candidate must be provided in this form;
⎫ All information received will be treated with strict confidentiality and will not be used for any
other purpose than to assess the suitability of the applicant; and
⎫ Correspondence regarding the applications will be to the successful applicants only.
A. PERSONAL DETAILS
Surname
First Names
Age
ID Number
Race African Colored Indian White
Gender Female Male
Do you have a disability? Yes No
If yes, elaborate
Are you a South African citizen? Yes No
Do you have a criminal record? Yes No
If yes, elaborate
3
B. CONTACT DETAILS
Email address
Mobile Number
Physical Address
Which Metropolitan Municipality do you reside in?
C. QUALIFICATIONS
Kindly tick the box that represents your NQF level
NQF 3 - N2 / Grade 11
NQF 2 - N1 / Grade 10
NQF 1 - Grade 9 / ABET Level 4
HIGHEST GRADE PASSED
Name of School Province Highest Grade Passed Year Obtained
OTHER QUALIFICATIONS OBTAINED
Name of institution Name of Qualification Qualification Type (e.g. Certificate,etc.) Year Obtained
D. DECLARATION
I hereby declare that all the information provided in this application and any attachments in support
thereof is to the best of my knowledge true and*TRADE*:
APPRENTICESHIP/TECHNICAL *TRAINING*. DATE ON WHICH APPRENTICESHIP WAS COMPLETED:
PERIOD OF APPRENTICESHIP OR TECHNICAL *TRAINING*: FROM:

REGISTRATION ...
4 pages
1
CITY POWER (SOC) LIMITED
ARTISAN-IN-TRAINING APPLICATION
ASSISTANT CHEF-IN-TRAINING
The Artisan-in-Training programme is applicable to unemployed persons who wish to pursue a career as Artisans. Once the application is approved,
the successful applicant will be required to submit documentation as requested.
NB. Please attach a certified copy of your South African identity with this application. Application forms without a certified copy of your South African ID will not be considered.
1. PERSONAL PARTICULARS (mark the appropriate box with an X)
Surname Full Names
Race African Indian Highest Qualification Gender Male Disability Yes Date of birth
Coloured White Institution Female No
D D M M Y Y Y Y
SA ID No.
Residential Address
Contact no. (work) Cell
Email address
2. ARTISAN-IN-TRAINING PROGRAMME APPLIED FOR
1 Artisan-in-Training: Electrician 3
2 Assistant Chef-in-Training 4
3. REQUIREMENTS SECTION: ASSISTANT CHEF TRAINEE (Please answer the following honestly. Any information given by you will be subject to a stringent verification process)
3.1 Do you have a 1 year post-matric/N3 Culinary Certificate Yes No
Give details:
3.2 Do you have at least 1 years kitchen/culinary experience Yes No
Give details:
4. DECLARATION
I declare that the information submitted above is accurate, true and honest
Applicant's signature Date
N.B. This application form does not serve as a job offer or an acceptance into the Artisan-in-Training programme. Should you not hear from us within 15 days of the

closing date consider your application unsuccessful.
Kindly return the completed form using this email address : recruitment.HRtm@citypower.co.za
www.citypower.co.za
City Power Johannesburg
40 Heronmere Road
Reuven
Johannesburg
PO B Box 38766
Booysens
2016
Tel +27(0) 11 490 7000
Fax +27(0) 11 490 7590
Non-Executive Directors: L Bethlehem (Chairperson of the Board), H Chewane, D Gibson, D Hunt, N Mcubuse, M Mello, L Nage, M Seopela
Executive Directors: L Setshedi (Chief Executive Officer), Q Green (Chief Financial Officer)
M Smith (Company Secretary)
Registration number: 2000/030051/30
VAT number: 4710191182
Engineering graduates in training 2018/2019
City Power Johannesburg (SOC) Limited as a progressive company committed to the skills and development initiatives of the country and striving for the social and economic development of the region, invites suitable candidates with excellent academic performance to apply for graduate in training programme who completed their Electrical Engineering Degrees in South African universities.
Requirements
□ You must be an Electrical Engineering graduate from a South African University
□ You must be a South African Citizen (women applicants will have an added advantage to address employment equity quotas of the company)
□ Your CV (maximum two pages)
□ Certified copy of academic transcript.
□ Certified copy of Qualification/Completion letter
□ Certified copy of Matric certificate
□ Certified copy of South African Identity Document
Academic Streams Targeted
Applicants who have completed their Electrical Engineering degrees in one of the following field:
□ Electrical Engineering (Heavy/Light Current)
To Apply
Kindly forward your Applications to recruitment.HR&T@citypower.co.za quoting "GIT 2018/2019". In case of further information regarding this advertisement, please contact: The assigned HR &T personnel, Thandi Sithole 011 490 7545 or Grieta Phiri 011 490 7394.
NB: Faxed/post applications will not be considered. You can download the application form on the web address: Application Form for Employment (Graduates Internship)_2019
□ Closing Date : 25 January 2019
Note:
□ City Power is an Employment Equity Employer; therefore, the configuration of a CI during the pr

Submission:

• Legogo to revisit 119 accounts with no access
• 20 accounts have no meters, meters to be installed
• 5 business accounts with prepaid meters, verify the tariff on the system

Fourth Submission:

• Legogo to provide a date for visitation to the 119 properties with no access
• Legogo to assist delivery of the 20 letters to the customer addresses found with no meters
• Revenue recovered from the tariff changes is R16 million, projected R80 million

Other Income

Fees earned for the year are more than the budget by R4 million due to sundry revenue that is R4 million less than budget due to the decrease in insurance claim refunds.
Other income for the year is R61 million less than budget due to the following:
• Cut-off fees are less than the

budget by R35 million due to fewer cut offs.
• DSM Levy is less than the budget by R12 million. Capital contribution (which is the DSM Levy) fluctuates as per the units sold. Therefore, the higher the units sold, the higher the capital contribution. Since the YTD actual units sold were less than
the budgeted units, the actual capital contribution was also less than budgeted.
• Government Grants for the year are more than the budget by R5 million; additional claims for grants were claimed.
• Interest revenue for the year is more than the budget by R33 million. This is due to the increase in outstanding debtors as a
result of the COVID-19 pandemic.

Expenditure

A negative variance of 0.48% against the budget was realised for the current period under review.

Bulk Purchases Eskom & Kelvin

Bulk purchases cost from Eskom is less than budget and mainly attributable to the fact that the actual bulk units purchased were
below budget. The Electricity supply from Eskom is displaced to the extent that Kelvin Power Station is able to supply electricity.
The overall electricity demand was lower than the budget.
The Kelvin Power Station, unfavourable variance of R221 million is attributable to the actual bulk purchase cost per unit being
higher than the budget. The favourable volume variance helped reduce the overall YTD variance.
Employee-related costs - Basic salaries are less than the budget by R5 million.
Depreciation is R27 million less than the budget due to slow capitalization of assets and the underspending of the Capex budget.
Finance cost is R13 million more than budget because of the increase in loans from Shareholder
Debt impairment is R358 million more than budget because of the poor collection level.
Repairs & Maintenance is 26% below budget as a result of contracts not finalised.
Capital Expenditure Details
The expenditure at financial year end after taking into account accruals amounted to R684 million compared to the revised budget
of R754 million which is R70 million below the target, this translates to 91% expenditure as at the 30th of June 2021.

Project Detail	Original Budget (R'000)	YTD Actual (R'000)	YTD Variance (R'000)
Electrification	113,817,000	112,938,577	878,423
Service Connections	48,500,000	95,603,711	(47,103,711)
Upgrade of Electrical Network	167,200,000	203,045,939	(35,845,939)
Building Alteration/Construction	2,803,115	157,174	2,645,941
Computers	4,800,000	4,817,441	(17,441)
Office Equipment	100,000	193,561	(93,561)
Computer Software	22,246,885	-	22,246,885

Tools and Loose Gear 4,600,000 240,044 4,359,956
Telecommunication 20,000,000 19,984,418 15,582
Fire and Security 5,000,000 2,552,202 2,447,798
Meters 70,500,000 59,260,533 11,239,467
SCADA 10,000,000 - 10,000,000
Protection 10,000,000 - 10,000,000
Furniture 450,000 340,286 109,714
Public Lighting 60,000,000 57,223,901 2,776,100
Refurbish of Bulk Infrastructure 213,949,000 28,100,943 114,038,248
Insurance - 28,100,943 (28,100,943)
TOTAL 753,966,000 684,369,481 69,596,519

Table 89: Capital Expenditure

Table 90: Controllable Capex

Description	Actual (R'000)	Budget (R'000)	Variance (R'000)	% Variance	Previous Year YTD (R'000)
Bulk Purchases	12,133,490	12,175,141	41,651	0%	11,523,086
Employee-Related costs	1,296,688	1,354,944	58,256	4.3%	1,265,014
Administration	103,618	172,662	69,044	40%	104,017
Depreciation	586,937	560,093	(26,844)	-5%	589,517
Finance costs	523,890	511,007	(12,883)	-3%	574,478
Lease rentals	688,502	714,137	25,635	4%	689,973
Debt Impairment	792,538	434,830	(357,708)	-82%	453,655
Repairs and Maintenance	813,225	1,094,209	280,984	25.7%	978,385
General Expenses	1,406,978	722,356	(684,622)	(94.8%)	578,757

Controllable Capex

The expenditure at financial year end after taking into account accruals amounted to R561 million compared to the year-end target of R705 million which is R145 million below the budget, the underspending is mainly attributed to delays in the execution of projects under bulk infrastructure as well as other Capex & Asset purchases due to lockdown regulations.

Table 91: Non-Controllable Capex

Electrical Infrastructure

Electrical infrastructure comprises Upgrade of Electrical Networks, Meters, SCADA and Load management projects. The expenditure at financial year end after taking into account accruals amounted to R285 million against the budget of R273 million which is R12 million above the target. The overspending was as a result of fast-tracking of upgrades of electrical network and emergencies which came into effect due to winter season which caused an overloading on the grid.

Power Systems

Power Systems comprises the Protection project. The expenditure at financial year end after taking into account accruals amounted to zero compared to the year-end budget of R10 million. It

should be noted that the amount not spent has been reallocated to emergency capital where urgent repairs were effected due to vandalism on infrastructure.

Bulk Infrastructure

The Bulk Infrastructure projects are a catalyst for economic growth and a key driver for property development, be it residential, business or commercial. The completion of these projects provides additional capacity that can supply new or increased customer demand for electricity. Furthermore, these projects improve the reliability and availability of supply by reducing outages that stemmed from ageing infrastructure at the substations level. The improved connectivity of the high voltage networks improves the main transmission corridors. These allow for electricity to be transferred from one corridor to another which minimises large scale and prolonged power outages. The investments in Bulk Infrastructure projects contribute to our network's modernisation, in line with City Power's vision of creating a smart grid for a smart city of the future. This infrastructure allows for remote control and monitoring of our substations and this minimises outage duration as diagnoses can be performed more speedily and restoration of supply expedited more efficiently. Most importantly, the new infrastructure provides improved safety for personnel; the new switchgear uses gas insulation instead of oil. There are therefore no risks of fire and explosion on this type of equipment. In addition, operating of equipment is performed in the substation control room or by the main System Control at City Power head office; these will go a long way in reducing work-related injuries and fatalities that are related to operating of old and potentially dangerous equipment.

The expenditure at financial year end after taking into account accruals amounted to R100 million compared to the year-end budget of R214 million which is R114 million below the target. The under expenditure was mainly attributed to the reduction in the number of employees (contractors) working on projects due to lockdown regulations (COVID-19), this had an effect on the work planned on all bulk projects.

Electrification

Electrification of informal settlements is aligned to the sustainable human settlements priority. Access to electricity has a substantial positive impact on the quality of life of the recipient communities such as those mentioned above. The programme is meant to improve revenue collection; reduce electrical and non-electrical losses, carbon footprint, and security of electricity supply, reduce illegal connections in and around informal settlements.

The expenditure at financial year end after taking into account accruals amounted to R112.9 million compared to the

budget of
R113.8 million, which is 99.2% expenditure.

Public Lights

The street lighting is also aligned to the sustainable human settlement priority and provides a number of important benefits such
as promoting security in urban areas and increasing the quality of life by artificially extending the hours in which it is light so that
activity can take place. Street lighting also improves safety and security for drivers, riders, and pedestrians. There has been
positive feedback from members of communities with regard to the difference the provision of streetlights have made in their
lives within their neighbourhoods. For this reason, there is an increase in demand from other communities in the form of petitions.
LED lighting projects have also been executed in the Northern and Southern areas, and they have been proven to reduce energy
consumption, resulting in energy savings. One of the LED streetlight benefits is that it typically requires less maintenance and
lasts longer.
The expenditure at financial year end after taking into account accruals amounted to R57 million compared to the budget of R60
million, which is a 95% expenditure. This reflects an under expenditure of R3 million, this was as a result of COVID-19.

Non-Controllable Capex

The non-controllable capital projects are projects which are funded by public contributions and through insurance funding. The
expenditure at year end amounted to R124 million against the year-end budget of R49 million, which is R75 million above the
target.

Table 92: Historical Financial Performance

Controllable Project Detail (by Project)	Original Budget (R'000)	YTD Actual (R'000)	YTD Variance (R'000)
Electrification	133,817,000	112,938,577	878,423
Public Lighting	60,000,000	57,223,901	2,776,100
Electrical Infrastructure	272,700,000	284,843,092	(12,143,092)
Power Systems	10,000,000	-	10,000,000
Other Capex and Asset Purchases	35,000,000	5,748,506	29,251,494
Refurbish of Bulk Infrastructure	213,949,000	99,910,752	114,038,248
TOTAL	705,466,000	560,664,827	144,801,173

Non-Controllable Project Detail (by Project)	Adjusted Budget (R'000)	YTD Actual (R'000)	YTD Variance (R'000)
Service Connections	48,500,000	95,603,711	(47,103,711)

Insurance - 28,100,943 (28,1002,943)
TOTAL 48,500,000 123,704,654 (75,204,654)

Service Connections

The Service Connections projects are funded by public contributions. The expenditure at financial year end after taking into account accruals amounted to R96 million compared to the year-end budget of R49 million which is R47 million above the target.

The overspending was a result of a higher number of service connections applications received than anticipated.

Insurance

This category of projects is funded by insurance as a result of insurable events. The expenditure at financial year end after taking into account accruals amounted to amounted to R28 million from the insurance claims received during the financial period.

5.3. Historical Financial Performance

The table below is taking stock of the company performance from an operational perspective for the past five financial years, including the performance for the current year ended 30 June 2021.

Table 93: Gross Margin and Losses Analysis

This information is drawn from financial information as reported to external parties (Audited). It should however be noted that the financial year ended 30 June 2021 is the only year not subjected to an audit.

	Actual 2017 (R'000)	Restated 2018 (R'000)	Actual 2019 (R'000)	Restated 2020 (R'000)	Actual 2021 (R'000)
Income					
Service charge revenue	13,099,192	12,717,091	13,157,970	14,424,857	14,839,937
ESKOM revenue	746,264	-	-	-	-
Prepaid	890,624	986,203	1,125,881	1,355,543	1,442,100
Total Service charges	14,736,080	13,703,294	14,283,851	15,780,400	16,282,037
Eskom	9,548,026	9,082,906	9,189,410	10,597,870	10,977,022
Kelvin	1,040,824	1,214,684	1,529,229	914,552	1,146,544
Kelvin Lease	471,220	513,873	571,502	634,489	626,487
Total Bulk Purchases	11,060,070	10,811,463	11,290,141	12,146,911	12,750,053
Gross Margin	3,676,010	2,891,831	2,993,710	3,633,489	3,531,984
Other Income	622,341	732,670	847,253	828,468	695,632
Other income	169,257	215,521	185,989	167,049	204,181
Capital grant	275,288	319,101	217,305	264,298	76,389
Interest revenue - debtors	55,555	68,275	63,532	35,978	58,288
Capital contribution	140,908	124,496	368,604	354,580	337,620
Rental income	251	474	556	602	616
Interest revenue - sweeping					

account 21,082 4,803 11,266 5,961 18,537 Total Income 4,338,351 3,624,501 3,840,963 4,461,957 4,227,616 Other Expenses Employee-Related Cost 972,921 1,087,605 1,121,564 1,265,014 1,296,688 Other Expenditure (Incl Tax) 2,235,172 2,101,821 2,030,916 2,219,693 2,096,604 General expenses (Incl Tax) 100,912 233,875 86,308 200,014 89,463 Contracted services 656,683 464,389 222,511 188,716 237,136 Repairs & maintenance 812,177 722,587 895,593 978,385 876,393 Internal charges(ME's) 164,924 193,563 258,763 263,060 306,674 Depreciation & amortisation		